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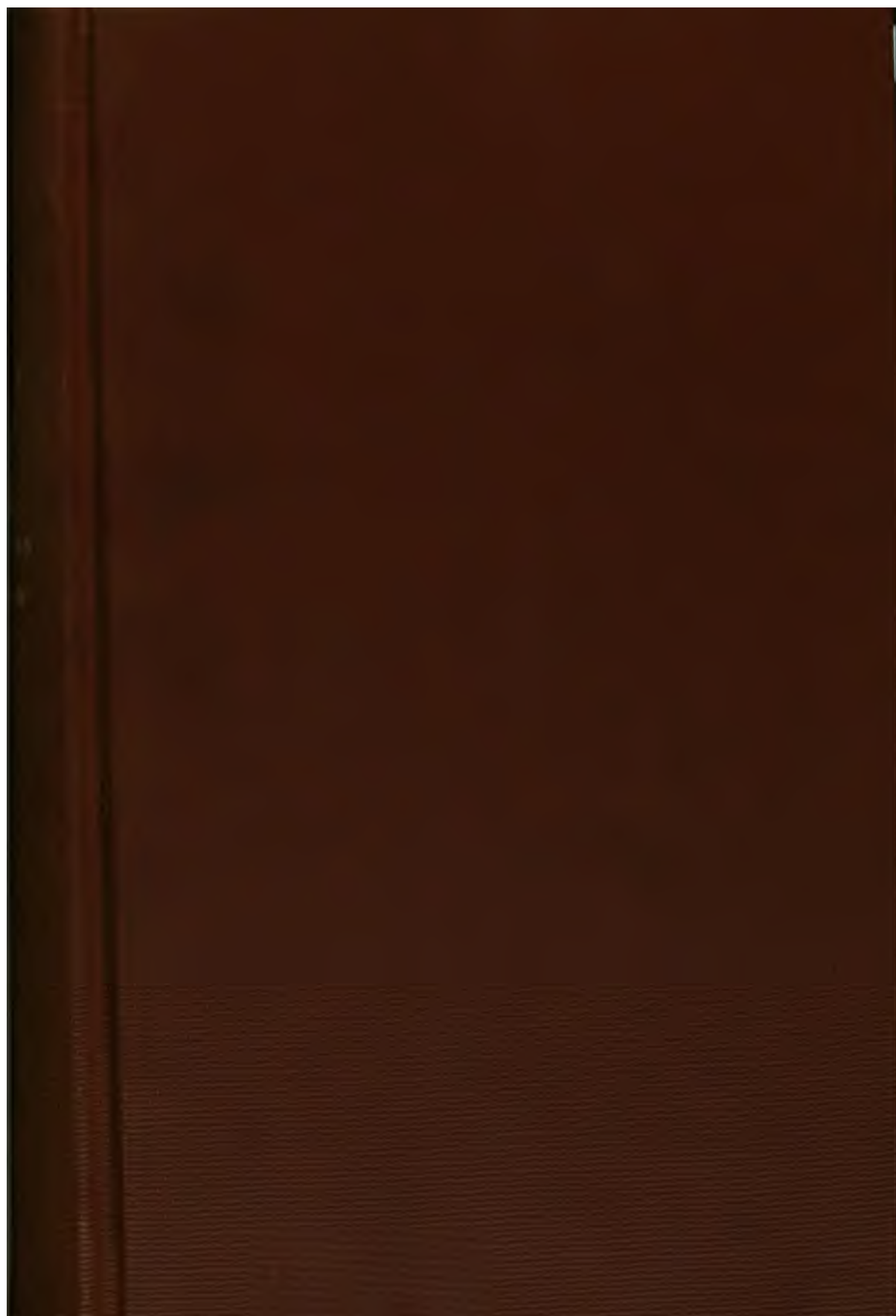
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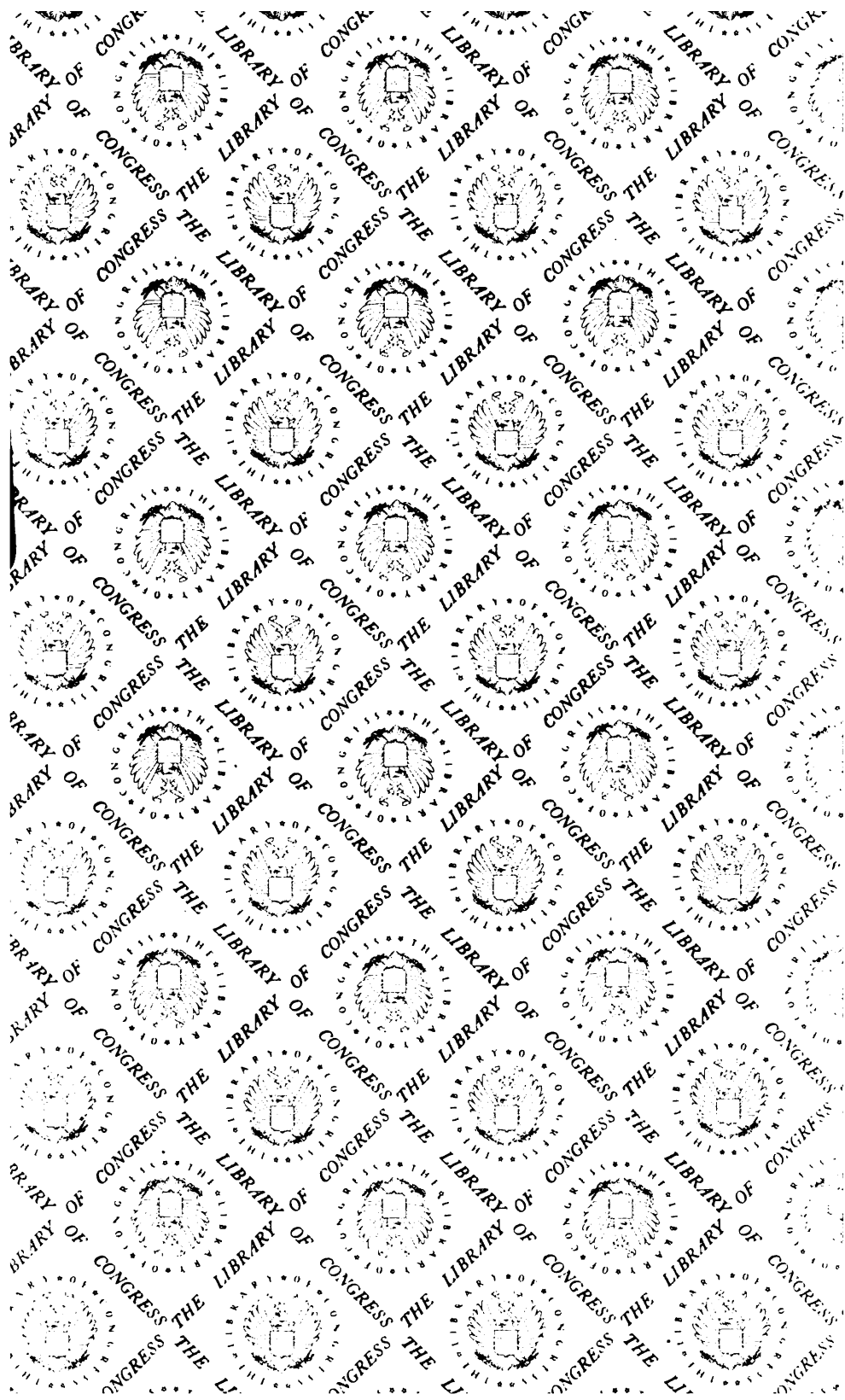
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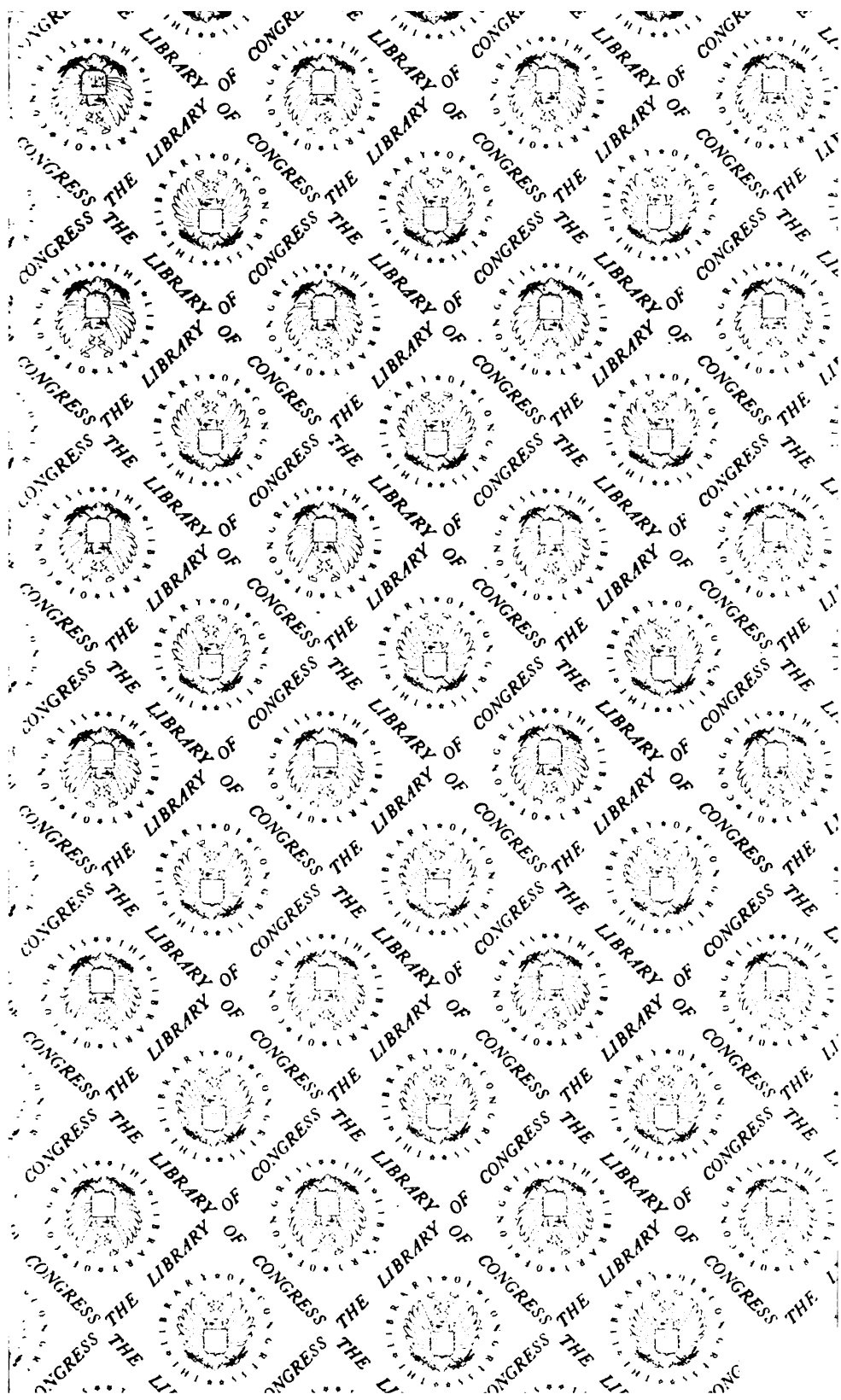
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HOUSE OF REPRESENTATIVES, UNITED STATES

U. S. 60th Cong., 1st sess. House.

"Hearings"

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HEARINGS

BEFORE THE COMMITTEE ON AGRICULTURE

OF THE HONORABLE SECRETARY OF AGRICULTURE
AND CHIEFS OF BUREAUS AND DIVISIONS
OF THE DEPARTMENT OF AGRICULTURE

ON THE ESTIMATES OF APPROPRIATIONS
FOR THE FISCAL YEAR END-
ING JUNE 30, 1909

ALSO OF MEMBERS OF CONGRESS AND OTHER PERSONS
INTERESTED IN MATTERS PERTAINING TO THE DE-
PARTMENT OF AGRICULTURE AND THE COMMITTEE

SIXTIETH CONGRESS

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AGRICULTURAL APPROPRIATION BILL.

HOUSE OF REPRESENTATIVES,
Monday, January 13, 1908.

The committee met at 10 o'clock a. m., Hon. Charles F. Scott (chairman) in the chair.

The CHAIRMAN. Gentlemen, in accordance with the order of last Wednesday the committee has met this morning to begin our regular hearings upon the appropriation bill, and I have invited Prof. Willis L. Moore, Chief of the Weather Bureau, to appear before us. I would suggest to Professor Moore that in the first instance he give us a sort of general review of the work of his Bureau, and that he should then call attention to any particular features of the work of the past year which he desires to mention. Later we would like to consult him in detail in regard to the items of his appropriation.

STATEMENT OF PROF. WILLIS L. MOORE, CHIEF OF THE WEATHER BUREAU.

Professor MOORE. Mr. Chairman, our work has proceeded as is usual during the past year. You do not want me to go into details, describing the current work of the service, the making of forecasts, and the issuing of storm warnings, the measuring of river heights, and the issuing of flood warnings; that is the current work, with which I think most of you gentlemen are familiar. We have taken up some lines of research work during the past year. We have continued our work at Mount Weather research station, and have gotten results that we believe mark an epoch in the development of meteorological science. It was to American genius that the world owed the development of meteorological science to the point where the Government could take hold and organize a storm-warning service. We came to the point finally where we were spending nearly a million and a half dollars a year to apply this science, begun by American investigators, but we were doing practically nothing to add to that science. The science is peculiar, because there is no institution and no set of men qualified to make researches in meteorological science except Government scientists, because this is one of the peculiarly developed Government sciences. There are no regularly instructed men except those the Government has instructed. So we have begun work along experimental lines at one station, and during the past summer we have succeeded in attacking the problem of the upper air quite effectively.

My greatest hope was that we might develop aeroplanes that would make flights on two days out of three throughout the year, but since June we have succeeded in flying our kites every day, without intermission, except on Sundays. We have for the first time been able

to put before the forecaster in Washington the vertical distribution of temperature, and the character of moving upper currents affecting the forecasts of the whole New England and Middle Atlantic States, giving us a picture of the conditions existing in the upper air, whereas before we were studying merely the conditions at the bottom of the ocean of atmosphere in which we live. We are now able to send up these aeroplanes and measure the conditions existing in the successive strata of the air vertically. We have here some quite startling data, which are exhibited on these sheets [indicating sheets on wall]. First, let me say that on the 3d of October we sent instruments $4\frac{1}{2}$ miles high—in fact, a little over $4\frac{1}{2}$ miles high—the greatest height ever reached with an aeroplane, which indicates that we shall soon fly these kites to a height of 5 or 6 miles, getting our measurements above the storms. It is probable that the most intense storm does not extend upward above 5 miles, and often not more than 3 miles. We anticipate that we will soon be able to send our meteorograph above the storms, going up and measuring the vertical gradients, and so trace the march of the seasons through from one year to another, and to determine at what elevation diurnal and annual variations cease.

The CHAIRMAN. What instruments do you send up?

Professor MOORE. We send up a specially designed thermometer, and a hygrometer to measure the relative humidity, and a barometer which expands and contracts with the increase or decrease of the pressure of the atmosphere, and then we get not only the pressure of the air, which indicates the height of the kite, but we get the temperature, which is traced on a sheet, traced right along, with the pressure of the air. We determine the height of the instrument also by triangulation, by getting the angles of the kites. Of course, we can see these kites on all days except when the lower ranges of the air are obscured by clouds.

The CHAIRMAN. Is the pressure of the air always the same, regardless of temperature or barometric conditions?

Professor MOORE. Oh, no.

The CHAIRMAN. I do not see, then, how the pressure of the atmosphere would indicate the height to which the kite has gone.

Professor MOORE. It will do that so well that with a little instrument no larger than my watch I can measure the height of this floor from the street below by just walking up here with it. That is due to the fact that between this floor and the street there is a stratum of air left below us as we ascend, which when we arrive on this floor does not exert pressure. It is the superincumbent air which exerts pressure, and that little instrument, just by taking account of the air which has been left below, enables us to measure the elevation. So that when you send up an instrument like that with a kite it will determine the elevation by the decrease in pressure as the kite goes up; not with absolute accuracy, because there is a variation of air pressure due to storm movement which you can not eliminate; but you can get very close to it.

Now, to go back to this chart here on the wall; this shows July, for instance. Here on the 1st of July the temperature was 70° at the surface of the earth, and up here at an elevation of 6,000 feet it was 66° . There is nothing very singular about that; but suppose we take a temperature of 65° and follow it through the month. We find here it stood a little higher on the 2d, and on the 3d it dropped down,

almost to the surface of the earth, at 2,000 feet elevation. Then it rose on the 4th and 5th and 6th, and it kept on, and here from the 5th away over here to the 12th that isothermal level [indicating], that temperature was maintained at an elevation of nearly 8,000 feet, and the surface temperature was 75°, and the temperature of 70° continued for several days at an elevation of 4,000 feet. Now we see the rise and fall of these isothermal levels, and we trace them up here to an altitude of 14,000 feet at a temperature of 34°, while the surface temperature was 70°.

I want to show you now this other chart. Here I will show you some extremely anomalous conditions. Here, for instance, on the 9th of the month the temperature was 66 at the surface of the earth. As the kite went up the temperature slowly fell 1°, to a height of 2,000 feet, and then the temperature began to rise, and at 4,500 feet the temperature was 72°, six degrees warmer than the surface of the earth. On the 16th of the month the temperature on the mountain was 63°, and then it falls off 1° with the first 1,000 feet, and then it begins to rise again, getting up to 64° at 2,000 feet, and not returning to the surface temperature until a mile in height is reached. We term that a reversal of gradient. Away up here there is a temperature, you see, higher than the temperature at the surface of the earth.

Mr. BEALL. What is the cause of that?

Professor MOORE. We do not exactly know. It is a new condition we are finding up there. In the fore part of October we found temperatures at about 2 miles high that were higher than anything we had found in August. Three or four days after that temperature in the high regions there came a period of warm temperature at the surface of the earth. You may remember those warm days in October. We can not say that these conditions begin in the high regions of the air first, before they reach us at the surface of the earth, but it is of peculiar interest to us to study that, and to find out what the relation is, at least.

Mr. McLAUGHLIN. Do you find that that has any relation to the storm conditions?

Professor MOORE. Yes. Three or four days before the frost that came through the Middle Atlantic States lately we found a temperature below zero at a height of 3 or 4 miles, when the surface temperature was about 50°, and within a few days frost materialized near the surface of the earth. We found, again, preceding one of our turbulent conditions on the Atlantic coast, very swift-moving currents in the upper regions, and we determined the velocity of these currents by the pull on this kite. We can not put an anemometer up there, but we can determine by the pull on the kite what the velocity is. We found early in December, when there was a storm coming up from the southwest, from the mouth of the Mississippi—a rain storm down at the mouth of the Mississippi that was coming up toward the Middle Atlantic States and toward New England and was running into an atmosphere on the surface down to 20°. That is a type that indicates a snowstorm for this region and farther northeast.

We do not know how to interpret all the data we are getting from the upper air. We are simply beginning to get them and study them. That is the justification for this institution. That is only one line of research that we are pursuing there.

Mr. POLLARD. Do you find that getting the temperature in these high strata enables you to make your forecast more accurate?

Professor MOORE. It has enabled us to correct our forecasts, many times; but even then, there will be errors in our forecasts; there are bound to be errors.

The CHAIRMAN. Have you made progress in any other line of work at Mount Weather?

Professor MOORE. That is the only line of research that has reached a position where we can apply it at the present time. We have the physical laboratory building, which is nearly complete. It was nearly complete when the work was stopped on it last year. The roof is partly on. There we want to study the problems as to the air. We want to study the problem of the condensation of the air. We do not know what all the processes are that take place in the air when rain and snow fall, and we want to carry on research with regard to electrification of the air and all those processes under which rain and snow occur.

Mr. POLLARD. Do I understand that all these forecasts you have been making for a number of years have been based on surface temperatures?

Professor MOORE. Entirely. I think the time will come when it will be useful for us to reestablish the stations at Pikes Peak and Mount Washington that were abandoned twenty years ago because the observations were found to be useless at that time. They were useful for a number of years, while we were studying theoretically the problem of storms, but they were mere land stations, as the mountain itself disturbed the conditions. Now that we are able to send instruments so high in the air every day by means of aeroplanes, it will probably be desirable sometime to put stations on Pikes Peak and Mount Washington. From those altitudes we will undoubtedly be able to send our instruments far above the most turbulent storms, 5 or 6 miles high, and it will be possible to determine whether the temperature of the air is constant, as we assume it is. We assume that there is no change there from year to year. I believe that there is an accumulation, or a deficit, of the heat in these upper regions of the air which has a very great effect on the conditions of our earth. Theoretically it is a constant condition. Sometime we will get up there; we are nearly approaching the time.

As you know, a fire burned our principal building at Mount Weather in October, the administration building, which quartered all the observers. The fire occurred about 4 o'clock in the morning. There were but eight men in the building. There were no women there. There had been one woman there, the wife of one of the observers, but she had left the day before. That fire had enveloped the building when the first person awoke. They got out barely with their lives. One man had to jump from the third story, and he was injured for life. His hip was broken in two places, and he was internally injured. One man was overcome by the smoke, and was dragged out, and came very near dying. The six remaining men carried them over to the power house and made them as comfortable as they could. They borrowed shoes and clothes from some of the people that came up to see the fire—they escaped in their undershirts and night clothes—but early in the morning they had their aeroplanes up, and did not miss an observation that day.

They were making a special effort to obtain a continuous record of observation; with two of their fellows lying injured in the power house they did not forget their work, although they did not have shirts to cover their nakedness.

Mr. RUCKER. What was the cause of the fire?

Professor MOORE. We do not know. There was no fire in the house, no fire in the cooking range since dinner, and the cooking range was right adjacent to where the men spent their evenings—on the first floor. There was no electricity used, and the fire began on the lower floor or in the basement, we do not know which. We can not form any idea how it started. It might have been incendiary, but we can not locate anybody. I had caused the discharge of a janitor about a month before, but I looked him up and I could find no evidence connecting him with the fire; so we are unable to give any explanation as to its source. All that we know is that the building burned. Since then we have had the dining room and the kitchen over the stable, and the observers are quartered in a little cottage that is on the place, and have managed to continue our work.

Mr. LEVER. How many observers have you there?

Professor MOORE. About fifteen people altogether, with the laborers on the grounds.

The CHAIRMAN. I believe the Secretary has sent in a supplementary estimate for an appropriation to construct a new building—

Professor MOORE. Yes.

The CHAIRMAN. To replace the one burned. That is before the Committee on Appropriations, is it not?

Professor MOORE. No; it is before this committee, I understand.

The CHAIRMAN. The Secretary had not called my attention to it; and inasmuch as it was an emergency appropriation, I presumed it would go to the Appropriations Committee, who would bring it in in their urgent deficiency bill.

Professor MOORE. I did not understand it that way. I understood that the Secretary had signed the letter and sent it to this committee.

The CHAIRMAN. I have not received anything of that character, and I would suggest that you call the matter to the attention of the Secretary and determine where it should go. If he wants the money to become immediately available, it would be in the nature of a deficiency, and perhaps might be carried on that bill, through the general Appropriations Committee.

Mr. HASKINS. There is a provision in this estimate including not exceeding \$15,000 for the completion of the physical laboratory building and the office and cottage building at Mount Weather, Virginia.

The CHAIRMAN. I think that this estimate was prepared before the fire occurred.

Professor MOORE. Yes.

The CHAIRMAN. And that item does not refer to the construction of the new building.

Professor MOORE. The estimate to restore the building that was burned was prepared only a few days ago, and probably has been delayed in the accounting office. I will look it up and see that it is filed immediately.

The CHAIRMAN. Unless Professor Moore has something else to offer in the way of general remarks, we would like to have him give his attention to the general items of his estimates of appropriation.

The first change I notice, on page 4 of the bill, is in the item making appropriation for seven clerks of class 3, where an increase of one is submitted.

Professor MOORE. You will notice that there is an increase altogether of three clerks.

The CHAIRMAN. Yes.

Professor MOORE. For the central office in Washington. You provide for a gradual increase in the work. It does not grow less. The demands grow greater all the time. And in that connection I call your attention to the fact that we have a less number of employees in the headquarters of the Chief of the Bureau now than we had thirteen years ago when I came to the head of the Bureau. I can not give you the exact number, but it is somewhere about 15 or 20 less.

Mr. HASKINS. What is the salary of clerks of class 3 and of class 1?

Professor MOORE. Clerks of class 3 receive \$1,600; clerks of class 2, \$1,400.

Mr. HASKINS. And clerks of class 1, \$1,200?

Professor MOORE. Clerks of class 1, \$1,200; yes.

Mr. HASKINS. And there is an increase of one at \$1,000?

Professor MOORE. Yes. There is need especially for those three clerks at the central office.

Mr. POLLARD. Are these clerks to be employed here in Washington?

Professor MOORE. Here in Washington, yes, sir. We have authority to detail from the stations, but we have not taken advantage of it except in one or two cases.

The CHAIRMAN. The current appropriation act does not carry any provision for increasing the number of stations?

Professor MOORE. No.

The CHAIRMAN. So that you have made no increase in the number of stations during the past year?

Professor MOORE. We have made no increase in the number of stations during the past year; none whatever.

The CHAIRMAN. Then how does it happen that there is an additional amount of work to be done, if the number of stations is the same?

Professor MOORE. The number of stations is the same, but the demands on the service all over the United States grow. Every community wants more and more service, and the communications to us asking for meteorological data is all the time on the increase, so that our business, as I say, is gradually growing, and I anticipate possibly the committee may make some increase in the number of stations and buildings, and if so it is still more necessary that we should have some increase in the clerical force in Washington.

The CHAIRMAN. On page 5 you provide an increase of one skilled mechanic. What have you to say about that?

Professor MOORE. That is for a painter. We ask for a painter and a watchman.

The CHAIRMAN. Do you call a watchman a skilled mechanic?

Professor MOORE. No; that man under the head of a skilled mechanic may be a painter, carpenter, or an instrument maker, or a horseshoer, or a blacksmith; any kind of a skilled workman. In our shops we make our own experimental instruments, and we make a great deal of our own apparatus. We have a good deal of mechanical

work at headquarters. There has been little increase in the number of these mechanics for a number of years.

The CHAIRMAN. Do you know whether it has been necessary to use any of your lump sum to supplement the work of the five skilled mechanics you had, in the past five years.

Professor MOORE. No; we have not done that.

The CHAIRMAN. You have been able to get along with the five?

Professor MOORE. Yes; we have been able to get along with the five, and we have been pushed to handle our station affairs with the sum we have had; therefore it has been impossible to detail from the station force. It is because of the necessity of using the lump sum entirely on the stations that this is necessary. We are paying less salaries from the lump sum than are paid to the statutory employees in Washington, scaling their salaries down in order to get more employees.

Mr. POLLARD. Professor, I understand you to say that the demand for these two or three clerks you have asked for is due to the increased demands on the service?

Professor MOORE. Yes.

Mr. POLLARD. Now, what is the nature of that? Is that due to demands for information in regard to the service or to an increase in the work in the way of experimentation, and so forth?

Professor MOORE. No; this has nothing to do with experimentation. It is due to the general increase of business in pretty nearly every division. Our reports are in demand; we do not give them away; we do not distribute them to everybody; we revise our list twice a year, and we say to a man, "If you want this report, you must fill out this card," and if he does not do that we cut him off the list.

The CHAIRMAN. We come next to your watchmen.

Professor MOORE. We have three watchmen, each one of whom is on duty for eight hours. On the night watch, from midnight to morning, I double up and put a fourth man on. I have been using a messenger for that service. Sometimes we have to use two messengers when one of these watchmen is sick, and so I need another watchman.

Mr. POLLARD. That is in Washington?

Professor MOORE. That is in Washington; yes, sir.

The CHAIRMAN. You think it is necessary to have two watchmen on duty from 12 o'clock midnight to 8 o'clock?

Professor MOORE. I think it is; yes, sir. I have found that it is very lonely for a man on that night watch, and even the best of men will sometimes go to sleep. Of course, we have got to check them. We check them by a clock. They have to turn that clock once an hour in each division of the office. We find it hard to preserve discipline in these lonely watches. Sometimes even the best of them will fail. It is a very lonely time of night. And then when the watchman is on it is necessary for him to answer the telephone and look after the door and do other things, and I have concluded that it is better to have two men on duty.

Mr. HASKINS. Are these men over at your office?

Professor MOORE. Yes, sir; over at my office.

Mr. HASKINS. You ought to have one at Mount Weather Station, ought you not?

Professor MOORE. Yes; I have hoped to put one there. I hope next year to be able to do so.

Mr. COOK. Are you limited, under the law, to these men being on watch over eight hours?

Professor MOORE. Yes, sir; we are limited to eight hours.

Mr. HASKINS. These men you are asking for would each one perform their eight hours' labor?

Professor MOORE. Yes; we would not shorten the hours of labor at all.

The CHAIRMAN. The only difference in regard to the watchmen would be that you would put two men on from 12 o'clock midnight to 8 o'clock in the morning?

Professor MOORE. I have two on now, but I utilize a messenger for one, and I want a watchman to take the place of that messenger.

The CHAIRMAN. Would the employment of that watchman eliminate the necessity, then, for the messenger?

Professor MOORE. Under a strict construction, it would; but I am crowded for a messenger force, so that I think another watchman should be assigned there.

The CHAIRMAN. I do not notice any further changes until we get to the item "Contingent expenses, Weather Bureau." I call your attention to the note on page 5 of the bill, where you say, "An increase of \$2,000 is submitted because the sum at present appropriated is insufficient for the requirements of the office on account of the material increase in the cost of supplies." I would like to inquire how much was expended in 1907; that is, whether you expended the entire amount of your appropriation in 1907?

Professor MOORE. Practically the entire amount; yes, sir. That appropriation has remained the same for a number of years, and under this we have to bear all expense of supplies and stationery and such things for the central office.

The CHAIRMAN. I asked the question because I should think that material of this character would not be any more expensive next year than it was this year or last year.

Professor MOORE. The cost of such material has gone up probably 33 per cent. It is much greater than it was four or five years ago. That being the case, we have not been able to supply our real needs, and we have been using old stuff that we would have thrown out if we had had an appropriation that kept pace with the advance in the prices of things. Everything for use in the city of Washington should be purchased from this fund, and we have found that we have had great difficulty in maintaining our supplies for the central office, especially with the increased cost of everything.

Mr. HASKINS. You say you practically used your \$10,000 appropriated last year?

Professor MOORE. Yes; if you attempted to spend every dollar of a fund you would have a deficit, and you know what the penalty is for a deficit. I can give you the amount we had left in round numbers. There might have been a few dollars returned to the Treasury, probably \$200 or \$300, not over that.

The CHAIRMAN. What I had in mind was that if this fund has not been increased for several years you must have found it very difficult to meet your necessities last year, with the advanced prices of necessities, or you must have had a large surplus five or six years ago.

Professor MOORE. No, sir; there is the point. You will understand from an illustration. You may have a lot of furniture in this room that may be used or may be dispensed with, and if you can not buy new furniture you will use it, but in time there will come poverty in your household.

The CHAIRMAN. On page 6 you have an increase for skilled mechanics, and the note explains that these employees are now on the roll, and it is simply desired to have them specifically named in the appropriation bill. Is there anything to add to that?

Professor MOORE. No. It is not absolutely necessary that those words "skilled mechanics" should go in there, but it makes the law more specific and makes it a little plainer. It says at the bottom "other necessary employees;" but as we do use a number of skilled mechanics, and as we have appointments made out to skilled mechanics, we thought it well to repeat the title in there.

The CHAIRMAN. In the note an explanation is given of the increase of \$65,500 which is submitted. Will you comment upon the various items mentioned there?

Professor MOORE. In the first place, this is to give promotion after one year's service to assistant observers who have an initial compensation of \$720 per annum. I wish to have promoted an observer who renders successful service for one year, and who has only received \$60 a month for that year. We require a high standard of fitness in our young men, and during the past year it has been almost impossible to recruit the Weather Service with men at \$60 a month. And then after I get a man to a station, he begins immediately to write me, "I will have to resign; I can not live on \$60 a month. It costs me more than \$60 a month to live here." Sometimes young fellows will get married, you know, and in fact they seem to have a habit of getting married after they get their appointments, unfortunately. We have been able to promote them after the expiration of two years from \$60 a month to \$70. The initial salary was originally \$840, and it was on my recommendation to the Secretary that it was reduced to \$720. In those days we could get all the men we wanted at that salary, but now we can not. They have to start now at \$720 and have to stay at that for two years.

Mr. McLAUGHLIN. Is there a provision for promotion after the second year?

Professor MOORE. Only our own office recommendations; but I want to have them promoted after one year, now.

Mr. McLAUGHLIN. To what figure do you promote them now?

Professor MOORE. To \$840.

Mr. McLAUGHLIN. And what do you propose to advance them to after one year?

Professor MOORE. Eight hundred and forty dollars. Now we are promoting them at the end of two years. I have some men who have been in two years who have matured, and we have not the money to promote them when they should be promoted.

The CHAIRMAN. If you promote them to \$840 at the end of one year, as you recommend here, will you expect to promote them again at the end of two years?

Professor MOORE. No. Then, after they have served two years more in the \$840 grade, and have passed a thorough examination, such as we ourselves provide, and have maintained a good record.

they may be advanced to \$1,000. That will make three years before they get to \$1,000. Then they can not get to \$1,200 until after two years more, making five years in the service before a man can reach \$1,200, and then they must pass another series of examinations. Our requirements are very rigid, and we exact a great deal from a man for a small salary.

Mr. LAMB. What is the examination?

Professor MOORE. The examination is to test their fitness for the things that they must do. For instance, an observer may get to \$840 without passing any other examination than that which he has had before the civil service, but before he can go to \$1,000 he must pass a rigid examination in the English language and in elementary meteorology. We examine him in the English language because very soon he may have to write reports for publication, and we want him to be able to write reports fit to go to the press. We want a man tested in meteorology because he should learn it at this time if he is ever to learn it at all.

The CHAIRMAN. Are these men college graduates?

Professor MOORE. They are largely college graduates and graduates of agricultural colleges, but not necessarily so. Sometimes they are high school boys, and sometimes they are men who come in and qualify themselves for the passing of an examination under the civil service. We show no preference. A man has to measure up to our standards and must pass our tests or he can not go forward.

In regard to examinations, I would not like to leave the impression on your minds that we test the fitness of our employees by competitive theoretical tests only. I think that a mere competitive theoretical test of a man for promotion in the public service is almost as bad as the making of appointments without any test of fitness, because there are qualities in a man that you can not test by any examination; that is, the personal equation of the man. A man's ability to well apply a little theoretical knowledge may often enable him to accomplish more than another man who poorly applies much theoretical knowledge; so that we say, "Young man, you must be familiar with this text-book, and this one, and this one, and we will examine you in them before you can be promoted; but if you pass these tests, and your record for aptitude is not good, and your record for obedience is not good, and if your record for personal integrity is not good, you can not advance." We try to combine the theoretical and the practical and to give the theoretical only its due weight. I believe in intellectual growth, and it is a matter of intellectual growth that enables a man to apply his knowledge, whatever it is, and not a mere cramming of book knowledge.

The CHAIRMAN. The next item is in regard to messenger boys.

Professor MOORE. Yes. In the same way we take our messenger boys in at \$360. Five or ten years ago \$30 a month would get us a good messenger boy. Now, we can not get them for that, and I speak with a full knowledge of what I am talking about when I say that station after station, in the past year or two, has been unable to get anybody to take the examination, and when we have tried to get some one to take the appointment without examination we could get no one to take the position; and in the last twelve months, as you will see from the statement in the back of my report, out of 100 messenger boys, 34 have resigned. They have left the service because

they can not live on \$30 a month. It will take about \$12,000 to raise these messenger boys to \$40 a month.

The CHAIRMAN. I suppose the messenger boys are employed only in the large cities?

Professor MOORE. They are employed wherever we have maps to distribute and reports to carry between the station and the telegraph office. At a simple station where all we require is the taking of an observation and the recording of it and the telegraphing of it, like Modena, Utah, for instance, where there is none of this service to be performed, we have only one man. He probably does not work very hard, but we have to keep him there. We have no messenger boy there, of course.

Mr. COOK. What is the average age of these messenger boys?

Professor MOORE. Fourteen to 18 years. They have an opportunity to get into the observation service. A great many of them are high-school boys. They have an opportunity to get our text-books from the little library that goes with every station, and we allow the man in charge to hear them recite once a week in their studies, and they have an opportunity to advance and get in under the civil service, and it is a fact that quite a large number of them come into the full service. Thirty dollars a month is too little now. We are only promoting them to \$480 after two years, and I want to put them up to \$480 at the end of one year's service. That is little enough for us to pay.

You have left with the Department the power to control these salaries on the lump-sum roll. We believe that we can administer the salaries, outside of Washington, and get a better return for the money than we could if you made the places statutory, and in trying to employ enough men to do the work we have got the salaries down too low, and we are asking for money to raise the low grades a little. These salaries are less, on the average, than the salaries you gentlemen provide here in Washington, and as long as we keep within that limit we feel that we are keeping within the spirit of the law. If we should raise these salaries above the salaries that you provide here in Washington, then objection might fairly be made.

Mr. LEVER. Are these boys on duty continuously during the day?

Professor MOORE. Entirely so. They serve continuously. In some few places we have employed student assistants, who are not under the civil service, and who get \$25 a month and who give three hours a day to the service. Sometimes our office is in a university. We have a rush in the early hours getting out maps, and then we have to take observations and do other work from 7 to 10 during the evening hours, and in some places we employ students at \$25 a month to help out during the busy hours. These students only serve three hours a day, and they are students who are studying at the same time, and they thus work out their scholarships.

Mr. LEVER. Would \$30 a month for a boy 14 years of age be considered reasonable compensation for such a boy in the ordinary commercial world?

Professor MOORE. There are many of them older than 14 years. Fourteen is the youngest that we take.

Mr. LEVER. Well, take a boy of 14?

Professor MOORE. I hardly think it would. I know it would not. These boys are leaving us all the time and going into commercial

houses, and getting more pay, so that a little over one-third of the messengers employed in the service have left during the past twelve months.

Mr. RUCKER. One-third of them have left on account of receiving an increase in wages?

Professor MOORE. Yes.

Mr. RUCKER. Is it not true that many of them left because the employment outside was more congenial than that in the service?

Professor MOORE. I think our service is most congenial to almost all of them. Of that one-third of the messenger boys, all did not go away to get an increase of salary, but I mean, taking the service all told, over 33 per cent did leave the service on account of their inability to live on the salary or for other reasons.

The CHAIRMAN. You think most of them, or a large number of them, would have remained if you had been able to promise them promotion at the end of the year?

Professor MOORE. Yes.

The CHAIRMAN. I understand your intention is to hold them in the service, holding out the promise of promotion at the end of a year?

Professor MOORE. Yes; just as we want to promise to promote the observer to \$840 at the end of one year.

Now, we come to the reserve force of about fourteen or fifteen observers for which we ask.

Mr. BEALL. How many of the stations have you this year which are issuing maps?

Professor MOORE. About one hundred stations. Some few of our stations have two messengers. Boston, New York, and Philadelphia each have two messengers.

Mr. LEVER. How many stations are there altogether?

Professor MOORE. About two hundred.

Mr. LEVER. About half of them issue maps?

Professor MOORE. Yes. I will give you an illustration. When a vacancy occurred, as it did recently, at Galveston, and the civil service was drawn upon, we filled the vacancy with a civil-service employee. It happened that within a few months preceding several other vacancies had occurred there, so that of 5 men there, there were 3 new men on the station.

Mr. POLLARD. What was the cause of these vacancies?

Professor MOORE. I could not tell you now; death, or resignation, or possibly dismissal. I could not tell you now what caused them. Possibly transfers to other stations. If a vacancy occurs at one station, and our catalogue list of preferences shows that another man wants to go to that station, and he is on the list for promotion, he may be ordered there; and then the vacancy that is created by his going there will be filled by consulting the preferences of other men, and so it will go on until finally we get to the end, and we find an undesirable station, and into that position we will put a new civil-service appointee. Each man has an opportunity to move up to a more desirable assignment, with due consideration for the exigencies of the service. We do not disturb a man who is satisfactorily performing his duties, if he is acting as first assistant or official in charge, unless there is some very good reason, in the interests of the public service, to disturb him. But below that we shift our young men about freely, and if we can gratify a man without injury to the public service we

always put him where he would like to go. We think it is to the interest of the public service to put a man where he would like to go rather than to keep him where he does not want to stay.

I started to tell about the employment of a new man at Galveston. We must have a man at the board of trade to make the glass map, like the one you have here in the lobby of the House, that is made up each morning for the board of trade. We must have a trained man to write the chalk-plate map that is to be printed and distributed, and we must have a man to make the stencil map, which the local forecaster must study before he makes his forecast. When you insert a new and untrained man, part of the machinery of that station fails to work at a time when all the work of the station should move at the same time; and if the machinery of the station does fail, shippers do not get their maps on time, and grain dealers and producers or buyers complain. The board of trade people complain if their map is not done on time—if it is not posted at the same minute that it is posted in New York and Chicago and Boston. What I want to do is to train young men for three or four months before they are sent out to stations. You may say that at a station like Galveston they ought to have a force large enough so that they can meet such cases as this—they ought to have a reserve man at the station. That is true; we ought to have, but we have not enough force now.

Mr. POLLARD. Did I understand you to say that in filling a vacancy in such a station as the one you have referred to you would take a man from another station?

Professor MOORE. Yes; we might do so.

Mr. POLLARD. That man would be experienced, would he not?

Professor MOORE. Yes; but the vacancy left at that other station would have to be filled by a man taken from some other station, and so we would go on down the line until we found a vacancy at the end of the line, which would be filled by a new man. Finally there is a vacancy which must be filled by original appointment.

The CHAIRMAN. But in your large stations, where there are four or five men, is there not always an understudy, an assistant, who can do the work temporarily which the chief is doing?

Professor MOORE. Always; there are always understudies for all grades. But this thing remains, that when a vacancy occurs in a place and you have to fill it with an untrained man, for the time being you have delayed the operations of that station for the next six months, until that man can take up and do those duties as expeditiously as the other man did them, and in the meantime there are failures in promptness, and then we get complaints all along the line. What I want to do is to establish a school of instruction here in Washington and keep here twelve or fifteen young men receiving proper instruction as to the work of the stations, so that when a vacancy occurs on a big station, we can take a man who is trained at headquarters and send him right out there. The only other alternative to keep our work running satisfactorily to the commercial and marine interests is to have an extra man on every station. I can remove this difficulty by keeping twelve or fifteen men studying here. This is no imaginary difficulty. I can show you complaint after complaint based upon the grounds that the business was delayed in the morning. The commercial interests all over the country wait for the weather report. We have to be very particular not to

let one city get the least advance information in the morning ahead of another city; so we have our reports all prepared together, and then, simultaneously in all these places, the observer steps up and begins to supply the information at each board of trade at the same moment.

The CHAIRMAN. How many boards of trade do you supply in that way?

Professor MOORE. Between 75 and 100. They want these data when they are fresh in the morning, as quick as they can get them. The shipper who is starting a shipment to the South or to the East or to the West wants to know what weather is going to prevail, and the first thing the speculator wants to know is whether there has been rain on the corn or on the wheat belt of the country. That is the first thing the grain speculator wants to know. So that the great business interests of the country wait every morning for the weather report, and their operations largely hinge every morning upon the weather statement. And if we can not get this information to them at the earliest moment, if we can not give it to them always at the same time that we give it to others, they call us to account, and very properly so. What I want to do is to make our machine move smoothly at all times, and instead of putting an extra man at every station for emergencies, I want a school of instruction where I can keep 14 men under instruction all the time.

Mr. HAWLEY. Who will have charge of the instruction of these men?

Professor MOORE. Our various experts here in Washington. One morning the man in charge of the instruments will come before them and will take the instruments apart and put them together again in their presence and give them instruction, and every man will be required to do that himself before he can pass. Then again, the chief of the forecast division will instruct them in reading a weather chart and interpreting the data. So all along, the chiefs of the various divisions here will instruct these men, and before we get through we will weed out all the incompetents before we send any of them out to station. Now, at the stations the men in charge spend a great deal of time in training the men sent out to them. A man may be sent out to a station who can pass the civil-service theoretical tests, and yet he may be utterly lacking in the ability to do those things which it is required of him to do. With these men in the school, at the end of a month I will send my recommendation to the Secretary of Agriculture, stating whether these men are competent or not, and the Secretary will put them out or retain them. I think it will be an economical thing to do to retain these men here and train them. I think it will be to the interest of the service.

Mr. LEVER. Suppose a vacancy occurs at Galveston.

Professor MOORE. Yes.

Mr. LEVER. What good would your reserve force do you here in filling that vacancy?

Professor MOORE. I would reach the man in charge at Galveston in thirty-six hours with a man who would be instructed and who would go straight there. Now I draw on the civil service and he gets an untrained man.

Mr. LEVER. You say you would send a trained man from some other station to Galveston?

Professor MOORE. Yes; and then I would leave a vacancy at that other station.

Mr. LEVER. Is not this the way you would do it, practically: Would you not send to Galveston a man from some other near-by station, qualified to handle that service, who was nearest to Galveston, and use your student here to fill the vacancy that might be created somewhere down the line?

Professor MOORE. Yes.

Mr. LEVER. In other words, you would not expect a student you had here to go at once to a responsible position?

Professor MOORE. No; he would go in at the bottom of the list. Let us suppose it is the first assistant on the Galveston station, the man who is next to the chief, and who is an understudy, who drops out. Then we carefully scan our list of the young observers who have now reached the \$1,000 or \$1,200 grade to see which one is competent to become the second man at a big station, like that at Galveston, and the man we select gets promotion; and he is selected purely on his merit, purely on the work he has done, and of course that would make a line of promotion all the way down. In two or three moves there would be a vacancy. That would be in the lowest grade, and that would be filled from this school by one of these men who had had anywhere from three to six months of actual work in addition to theoretical knowledge.

Mr. LEVER. Do you have authority of law to do that now?

Professor MOORE. We have authority, but not the money.

Mr. RUCKER. I understand you to ask here for \$15,500 for this purpose?

Professor MOORE. Yes.

Mr. RUCKER. And these fourteen young men, students, would be taught for from three to six months, and trained in the work, and, as I understand under or by the heads of the various divisions here in Washington?

Professor MOORE. Of the divisions here; yes.

Mr. RUCKER. How would that \$15,500 be expended; in paying them salaries while they were studying?

Professor MOORE. It simply takes care of their salaries; yes.

Mr. RUCKER. The \$15,500 would be used to pay the salaries of these young men who would be an increase of the force of these heads of divisions in Washington?

Professor MOORE. Not at all.

Mr. RUCKER. Or is it to be paid to the boys who are under instruction?

Professor MOORE. That \$15,500 we ask for is simply to pay the salaries of the fourteen men who are continuously here.

Mr. RUCKER. They are not in the service, and they are performing no duty?

Professor MOORE. They are in the service and under the civil service.

Mr. RUCKER. During this period of tuition they are doing nothing but studying and qualifying themselves?

Professor MOORE. I will not say "studying." They are practicing. They are getting manual dexterity in the things that are special in our service, and that they can not learn anywhere but in our service.

Mr. RUCKER. What I mean is this, that they are not performing any service so far as the public is immediately concerned, that the public is immediately interested in; they are merely qualifying themselves for future service?

Professor MOORE. Yes.

Mr. RUCKER. So that the Government would be paying the tuition of men in order to qualify them hereafter to take these Government positions?

Professor MOORE. Yes.

Mr. RUCKER. At any other place in the country they would require them to pay their own tuition.

Professor MOORE. We are doing this now. Every time we send a man to a station we are paying a man to do things that he does not know how to do.

Mr. RUCKER. There may be some inequalities, of course.

Professor MOORE. We have to do the best we can, but we are paying these men salaries while we are giving them the manual dexterity to do the things we want done; but we can not get them already trained, from the outside.

Mr. POLLARD. I understand you are asking for fourteen students, as you might term them, and are asking for an increase of \$15,500, and I understood you to say a while ago that these men start in at \$720?

Professor MOORE. Yes.

Mr. POLLARD. This amount would give those fourteen men over \$1,100 a year each.

Professor MOORE. Possibly I used the figure representing the amount of money for the number of my students.

Mr. POLLARD. The statement here says fourteen students, and it calls for \$15,500.

Professor MOORE. Is that so? It seems to be wrong. There seems to be an error there.

Mr. RUCKER. Is it the intention to pay these students \$60 a month during the time they are taking instructions?

Professor MOORE. The intention is to pay them \$720.

Mr. RUCKER. They are doing nothing except going to school, as I understand it, and they are getting salaries for going to school.

Professor MOORE. They are not going to school; they are doing mechanical work.

Mr. RUCKER. They are learning some other things, scientific and mechanical things?

Professor MOORE. I think the clerk in making up this schedule has got that wrong. What we want is fourteen men at \$720, whatever the amount is. It should be fourteen times \$720, whatever amount that would be.

Mr. RUCKER. So many men having already left the service, about thirty-three and one-third per cent—

Professor MOORE. Of the observers.

Mr. RUCKER (continuing). What assurance would you have, if you were to take a lot of Washington boys, and I assume that most of them come from the city of Washington—

Professor MOORE. Quite to the contrary; they do not come from here, and they can not get in from the city of Washington. They are barred from the city of Washington.

Mr. RUCKER. They are barred?

Professor MOORE. Yes.

Mr. RUCKER. That is the best thing that I have heard yet.

Professor MOORE. Yes.

Mr. RUCKER. But what assurance have you that these boys who come here from North Carolina or South Carolina or Kansas, wherever they come from, after we educate them would not turn their backs on us and take some other job?

Professor MOORE. None in the world. You can not force them to work if they do not want to. You can not provide against that.

The CHAIRMAN. One thing against that would be that the education he would give them is purely a scientific education that they would have no use for outside of the Weather Bureau Service.

Mr. RUCKER. Which is something that the Kansas or Missouri boy would be very proud of, of course. Is it true that there is some law that bars residents of the District of Columbia so that they could not get into this school of instruction?

Professor MOORE. The civil-service law apportions the appointments.

Mr. RUCKER. That has been so all the time, has it not?

Professor MOORE. Our records will show that our people come almost entirely—and have for the last several years, at least—from all over the country; from the little country towns all over the country.

Mr. RUCKER. I will venture to say that if you put this item in the bill, there will be 500 boys employed from Washington.

Professor MOORE. They can not get in.

Mr. RUCKER. There are about 5,000 of them in the Service from the District now.

Mr. HAWLEY. Do you think three months' study would qualify them for the work?

Professor MOORE. That would give them a great increase of mechanical dexterity. They can not get the instruction needed in any place except with us. We are really instructing these young men. We give them all the theoretical tests that we can provide before the civil service, and then we have to take them in and instruct them how to do the things mechanically that are required to be done at the weather station here to meet the commercial demands of the weather station.

Mr. LAMB. Do you get them from the civil service?

Professor MOORE. Yes.

Mr. RUCKER. I understand you to say that it requires from three to six months' instruction?

Professor MOORE. Yes.

Mr. RUCKER. If six months was the maximum, you would only want one-half that many?

Professor MOORE. No; I would want to keep that number all the time.

Mr. RUCKER. At that rate would you not soon have an excess of men, if every three months you graduated one class and took a new class? That would give you 42 or 48 men.

Professor MOORE. I will show you the exact number of new appointments, which is stated in the back part of my report. You will find there the number of new appointees, and you will see that this number will about meet the necessities. It is under the head of removals and appointments. It is here in this table, somewhere. I can not find it just at this moment, but the new appointments were somewhere in the neighborhood of 40 during the year—between 30 and 40.

Mr. LEVER. The question may be asked of some member of the committee on the floor what reason exists for a school of this kind in the Weather Bureau which does not exist for a similar school in the Bureau of Plant Industry or the Bureau of Animal Industry or in the Pension Office. Will you make that clear?

Professor MOORE. Because our duties are quite dissimilar from any of them. We have to do each morning a kind of work that requires a high degree of mechanical skill and dexterity, and the kind of dexterity that can not be acquired anywhere but with us. To do the duty in the Pension Office is a matter of clerical work; and neither the Bureau of Plant Industry nor the Bureau of Animal Industry has to reach the public every morning with a telegraphic report made up, collated, digested, and transmitted within an hour's time.

Mr. LEVER. The universities throughout the country do not teach this kind of work?

Professor MOORE. No.

Mr. LEVER. None in the country?

Professor MOORE. They do not teach the men to handle the instruments, and to do the mechanical work of the stations, and in issuing the maps and bulletins.

The CHAIRMAN. And you wish to provide for their tuition here, rather than scatter them out in the stations through the country, for that tuition?

Professor MOORE. Yes. We are short of men on most of our stations, and that is due to the fact that there are so many men on the stations who are almost worthless for the first few months. Suppose that we have 30 new men out at the stations. They require 30 experienced men to instruct them, and each man has to have a separate instructor; whereas if we instruct them here they are all trained by one man. That makes this an economical measure.

Mr. HASKINS. And you know which of the men are efficient before you send them out.

Professor MOORE. Yes. I know that before a man goes out to the local stations. There is economy and efficiency in the plan. I could get along as I am now, but this plan would certainly improve the efficiency and would be an economical measure. In the end I will have to come to the committee and ask to have the number of trained men increased for every station, but this would put off that day for some time.

Mr. POLLARD. You only want to keep 14 students at this school?

Professor MOORE. Yes.

Mr. POLLARD. Then, this item can be reduced from \$15,500 to \$10,880?

Professor MOORE. That is right.

The CHAIRMAN. If those men are simply to be concentrated here instead of being scattered over the country, why need you have any

additional funds? Their salary will not be any more here than at the stations of the country?

Professor MOORE. There will be at the station an absolute void that will be filled by nothing during the time that that man is being trained. I send him there and make an effort to fill that vacancy, but he does not fill it efficiently. As I say, we could get along with the methods under which we are now working, but I am asking for an increase in the power of our institution to execute for the benefit of the commercial interests. It is they that want this. I can show you many communications demanding that I keep our stations up to a high state of efficiency, so that no one need be put to any disadvantage in competition with any other shipper; so that no board of trade need be put at a disadvantage in competition with any other board of trade. We have to meet that demand.

Mr. McLAUGHLIN. Are these students to be entirely new to the Department, or will they be taken from some other branch for promotion?

Professor MOORE. No; they will be from the civil service. These are the low-grade observers. It is true that there may be among these observers here and there a messenger boy who has taken advantage of his opportunity to compete in the examinations under the civil service and who has been drawn into the list. We can not control the employment of these people in any way, and we could have no motive to bring them in there; a man, unless he has something to do, is a nuisance to an executive officer.

Mr. McLAUGHLIN. Is there any proper criticism of your suggestion that these young men, being students altogether, shall be paid at the same rate as the men who are actually doing the work for the Government?

Professor MOORE. I think we are wrong in using the word "student." These young men are doing something.

Mr. BEALL. What they are doing is of no special benefit to the Government. It is only in training themselves.

Professor MOORE. It is of benefit to the Government to give them the opportunity to learn.

Mr. BEALL. It is of future benefit to the Government; but they are not actually serving.

Professor MOORE. Not actually serving at an observation station, but I presume I shall utilize them, more or less, here and there. A man who learns quickly when he gets out will probably be made to do real work that will have real value at the central office here.

Mr. RUCKER. As I understood you, your idea about this training is that you find it very difficult to find competent men?

Professor MOORE. Yes, and I have difficulty in getting them to-day and sending them out.

Mr. RUCKER. And you have never before had this appropriation for training them?

Professor MOORE. Yes. When the Weather Bureau was under the War Department they not only did this training at Fort Myer, Va., but they maintained that expensive fort over there and they gave their men a year's schooling. I went through that school myself, years ago. They had a thorough training before they went out to do the work then. But since the Bureau has been under the Department of Agriculture this school of training has never been adopted. We are not

asking now for a school of training; we are simply asking for a little class at the central office.

Mr. McLAUGHLIN. What is the difference in the character of the work that these so-called students are to do and the character of the work being done by your first-year men, your \$720 men?

Professor MOORE. None.

Mr. McLAUGHLIN. None at all?

Professor MOORE. None whatever.

Mr. McLAUGHLIN. It is the same work?

Professor MOORE. It is the same work, except a considerable part of their work here would be done and thrown into the wastebasket in the first two or three weeks; I say that advisedly, because when I send these men to a station, right in actual practice, much of their work has to be thrown away. It can not be used. They have not had the actual experience. When that happens the work of that station is hampered. I want to eliminate that waste, and I want to improve the efficiency of the service. I will get rid of a number of undesirable men who are wasting the time of the Government, and I will prevent the waste of time in trying men who are not fit. It is very seldom that we pass an unfit man here. We exercise rigidly the power of exclusion.

Mr. RUCKER. It is practically adding to the class of the first-year men, 14 men to the service?

Professor MOORE. That is right.

Mr. RUCKER. And that would be kept up right along, 14 men every year?

Professor MOORE. Yes.

Mr. RUCKER. What rate of increase have you been having heretofore; anything like that?

Professor MOORE. Our increase heretofore has been largely for additional men at the stations. This is a direct increase.

Mr. POLLARD. About what is your average annual increase?

Professor MOORE. Our appointments run about 35 per annum.

Mr. HAWLEY. That includes increases and changes in places?

Professor MOORE. Yes.

The CHAIRMAN. While Professor Moore is before the committee, with the consent of the committee, I should like, out of consideration for my colleague, Congressman Madison, of Kansas, to interrupt the course of this hearing at this point for a few minutes. Mr. Madison has asked the privilege of appearing before the committee to speak a word in the interest of an appropriation that he hopes to have made for the construction of a Weather Bureau building at Dodge City, in his district, and before hearing him I think we would like to have a brief statement from Professor Moore, inasmuch as no paragraph appears in this estimate looking to the construction of any new Weather Bureau buildings, as to his views on that question.

Professor MOORE. At Dodge City we must maintain a station, because of the need of having an observation there for the making of the forecast farther eastward. Also, there are local interests in Dodge City which it is important that we serve. The fact of the matter is that our business at that station is increasing. Also, we have got to move. The construction of other and higher buildings round about renders the exposure of our instruments there very defective, and we must either construct a new building there or rent another building

and move from our present location. We do not like to change the elevation of our instruments when once erected. We desire to keep all our instruments for measuring pressure, and rainfall, and so forth, for a terms of years in as nearly the same environment as possible. Somebody says that the rainfall has increased or decreased in western Kansas. We want a rain gauge to explain that; we want the facts; and we want the instruments in precisely the same environment year after year, so that there will be no question but that the results will show the actual facts, either variation or no variation. If we change the environment, we are not certain the record of these instruments will be the same.

There have been some structures erected recently that render our catch of rainfall and our temperature observations and our rainfall observations defective. We must move; there is the point. We are constructing a certain number of Weather Bureau buildings. It is probably good policy for us to build first at those places where our present location is not the proper one. Along that line of reasoning, Dodge City would be a good place to build a Weather Bureau station. We must move from the place we occupy there very soon, and I do not want to move the station twice. I do not want to move it to a new rented location, and then in a few years construct a building and have to move a second time. If we do that, we would have three different sets of records. If we are to move at all, there, we desire to move when we construct a building. We are paying between \$300 and \$400 rent. I can not tell you the exact figures, but it is about that. That would be saved if a new building were constructed at an expense of \$12,000 or \$15,000. That is all that I care to say.

The CHAIRMAN. I will present Mr. Madison.

**STATEMENT OF HON. EDMOND H. MADISON, A REPRESENTATIVE
IN CONGRESS FROM THE STATE OF KANSAS.**

Mr. MADISON. I want to say very little. I think Mr. Moore has said it all, or practically all that can be said in regard to the matter, and I realize that you do not want to hear from anybody very much. The facts are, as he states, that a change must now be made. The town has trebled in population in the last three or four years. We had a population of three of four hundred at the last census, and now we have about 4,000, and the population and business demands have outgrown the buildings. There have been some buildings, of course, put up, and some are going up now, and your weather bureau now is located right in the central portion of the town, where these buildings are going up. On the northeast a large three-story Masonic temple has been built. That interferes with their observations. It is very close to this building, which interferes with the use of the building for the purposes indicated by the Professor. Then right across the railroad, and very near and directly south, there has gone up a large mill and elevator, and of course that breaks the force of the wind, so that I suppose it is impossible to get proper observations. I understand, as stated by the Professor, that their measurements have been rendered defective. A change is absolutely necessary there, and the question is where you shall go. It will be necessary to increase your rents rather than to diminish them. If you

go into another building there, it will be impossible, no doubt, to get rent as low as you are getting it now.

The CHAIRMAN. What is the present rent?

Mr. MADISON. The Professor has just stated that it is about \$400 a year. Now, there are some ideal locations that can be secured in the town. Some of you have been at Dodge, and know its location. I simply state briefly that it is on the north side of the Arkansas River. The main portion of the town is down on the bottom. Then the town runs up onto the north bluff, or hill. Of course there are no precipitous bluffs in that country along the Arkansas, but nevertheless the elevation of the top of the bluff is much higher than that of the bottom. There can be secured now some ideal locations up along these elevations. I think that so far as the matter of a location is concerned, our town, of course, would take care of the question of a site, and matters of that kind. This is the town in which I live. I do not know that I can say anything further about the matter. As Professor Moore has said, the station is an old one.

The CHAIRMAN. How old is it?

Mr. MADISON. About thirty years old; is not that right, Professor?

Professor MOORE. Yes; between thirty and thirty-five years.

Mr. MADISON. It is about 300 miles from the Rocky Mountains, and is on the gradient line passing from the Rocky Mountains to the Mississippi River, and is a place where the Department, as I understand, intends always to maintain a weather observatory. If there is any question you desire to ask me in regard to the matter, I will be very glad to reply. I do not want to take up your time.

Mr. POLLARD. How large a building have you there, a one-story building?

Mr. MADISON. No; it is a two-story building. It is a building owned by private persons. The rooms are both small and dark. There are two outside windows, I think, and then there is a room back of that.

Mr. POLLARD. The Government owns no building there?

Mr. MADISON. The Government owns no building there at all.

Mr. McLAUGHLIN. What do you mean by saying that the town would take care of a site?

Mr. MADISON. Would provide the site for the Government; I mean they would provide it free of charge. I do not make that as an absolute statement, but I think that would be true; and as I say, there are good sites there that can be obtained, but in a few years from now that will not be true. The town is growing, and the country is filling up.

Mr. HASKINS. What would be the character of the buildings that would be erected on this land around about where you would have the Weather Bureau station?

Mr. MADISON. It would be in the residential portion.

Mr. HASKINS. So that there would be no high buildings?

Mr. MADISON. No; nothing at all to interfere with them. Upon this bluff they would be, of course, free from any interference by anything, and yet at the same time would be within not over four or five blocks of the business part of the town. I have no particular site in mind. There are a number of sites that could be obtained that would be within four or five blocks of the business portion of the town. The observer could very readily get down to the business por-

tion of the town for the purpose of distributing his notices or the charts that he distributes each day stating the predictions of the Department.

Mr. HAWLEY. Have you a post-office building in your town?

Mr. MADISON. No; there is no post-office building. As I understand it, these buildings never contained the post-office. They simply provide for the residence of the observer, or that he may be there at all times for the purpose of making his observations, and looking after his instruments, and of course the offices of the observer. We have no post-office building that belongs to the Government.

If that is all, gentlemen, I thank you for the opportunity to appear briefly before you, and I do not want to take up any more of your time.

STATEMENT OF PROF. WILLIS L. MOORE—Resumed.

Professor MOORE. Mr. Chairman, we never build unless we get title to enough ground to protect the observatory from the encroachments of buildings on all sides. We go to a part of the city where we are not likely to get a twenty-story building on each side of us, and then we get enough ground to protect us for years to come.

The CHAIRMAN. I think it might be well, Professor, if you would state briefly why it is that your estimates this year contain no provision for new buildings, whether you have abandoned the policy which you have heretofore announced, of gradually constructing Federal buildings for your observers?

Professor MOORE. Mr. Chairman, the committee last year inserted a provision for a certain number of buildings, but in the House it was stricken out, I believe, on a point of order. It was not reinserted in the Senate. In making my recommendations to the Secretary and his forwarding them to you with his approval, there was no provision made for the construction of buildings. On my part I believed that as Congress had eliminated the appropriation, it would be proper for us not to make an estimate therefor the next year.

The CHAIRMAN. You are still of the opinion, as you have heretofore been, that it would be a wise policy for the Government to continue the construction of these buildings from time to time?

Professor MOORE. I believe so, and in case Congress should conclude to authorize the Department to construct these buildings, I would like to put this before you. I read you from my annual report, as follows:

I am of the opinion that the construction of observatory buildings should be continued until one is located at each of the principal stations of the service, where accurate and reliable observations are so necessary in the preparation of forecasts and warnings, and in supplying accurate meteorological data to large commercial communities. Their advantage over office buildings and public buildings, whose architecture in most cases unfits them for a satisfactory exposure of meteorological instruments, can not be gainsaid, and their maintenance per annum will not materially exceed the rental cost of offices in private buildings, and in many cases be less.

In Dodge City we are paying about \$400 per annum now, and we will doubtless have to pay \$1,000 when we move. That will be 4 per cent on \$25,000. If the ground is given us, we will build there probably at \$12,500.

Mr. McLAUGHLIN. Why do you say, if the ground is given you? Is it customary for the Government to receive donations in that way?

Professor MOORE. Not customary, but very often a university comes forward and says, "We will be glad to have you build your building on the campus of the university." Often they say, "We will be glad to have a little observatory constructed in this public square."

Mr. McLAUGHLIN. I think the Government should buy the land and pay for it.

Professor MOORE. I think so, myself. I do not think the Government should go into a community and ask that it be given something by the community, and the Department has not taken that position; but where the community says, "We desire to have this building erected here, and we will give you the site," we could not step up, could we, and say, "We insist upon paying for it?"

Mr. LAMB. Would you do that in Richmond?

Professor MOORE. You have never asked for it. You have been very modest.

The CHAIRMAN. Is it not true that in large cities, such as Chicago and New York—

Mr. LAMB. And Richmond.

The CHAIRMAN. And Richmond, and St. Louis, a suitable location could not be found for a Weather Bureau building?

Professor MOORE. We could get a location in Richmond, not too far off from the business part of the city, that would serve the needs of the Bureau; but in New York our chief difficulty is to get a suitable location for our observatory. It is almost impossible to get up to the top of these high buildings and get away from the heat of the ventilating shafts, and the smoke, and the heat, and the soot; and of course to buy a building downtown is out of the question. I am now making some effort there to see if we can not get into Central Park, and build in the lower side of Central Park. They are very jealous of that park, and probably will not give us permission. We are confronted with great difficulty in New York. I have said further in my report:

It is not desirable that all of the observatory buildings that are required be erected at one time. The work can be done to better advantage if a few are erected each year. I am of the opinion that observatories should be erected in the near future at the following places: Abilene, Tex.; Cheyenne, Wyo.; Cleveland, Ohio; Columbia, Mo.; Fort Wayne, Ind.; Lansing, Mich.; Mount Washington, N. H.; Neah Bay, Wash.; Pikes Peak, Colo.; Sandy Hook, N. J.; Sitka, Alaska; Houston, Tex., and in the vicinity of St. Paul and Minneapolis, Minn.

The building at Neah Bay will need to be only an inexpensive structure, costing not more than \$5,000. It is for the purpose of reporting vessels passing along the Straits of Juan de Fuca.

The building at Sandy Hook, New Jersey, is at the entrance of the harbor of New York.

The station between Minneapolis and St. Paul should be constructed so that we can close those two offices and make one office between.

Then there are some others here. There are seventeen places, at any one of which you could advantageously construct buildings at the present time.

Mr. RUCKER. In that connection, you suggest in one place Columbia, Mo. Would not Mobile or Chillicothe be just about as good?

Professor MOORE. No; because—

Mr. RUCKER. I do not care for any discussion. I just wanted your opinion.

The CHAIRMAN. It seems to me that immediately in this connection I might call your attention to the new matter which you have on page 7 of the bill, providing \$15,000 for the completion of the physical laboratory building and the office and cottage building at Mount Weather, Virginia. In view of the fact that the office and cottage building has been burned, would you want to modify that language?

Professor MOORE. The office and cottage building has not been burned. It was the main administration building which was burned. This office and cottage building is adjacent to the physical laboratory which is now almost completed, and it was the intention to provide additional living quarters as well as a library and working quarters for one of the experimental men there. Now that the old administration building has been burned, we could construct a new administration building so as to render this cottage-office building unnecessary. But as the building is almost complete, it would be advisable to complete it.

The CHAIRMAN. Then, with the exception of whatever appropriation may be given you for restoring the burned building, will this item carry all the money you want to spend this year at Mount Weather for buildings?

Professor MOORE. No; I think the Secretary signed a supplementary estimate a few days ago for the restoring of the administration building at Mount Weather; but you say you have not received that.

The CHAIRMAN. I would like to leave the restoration out of the question right now and come to this particular point.

Professor MOORE. Yes. That provision should remain in there, because it completes two buildings which are now almost completed, and they are two valuable structures.

The CHAIRMAN. Then let me repeat the question. Does this item carry all the money you want to use at Mount Weather for new buildings or for new equipment, aside from the restoration?

Professor MOORE. Oh, yes; aside from restoration; but does not include equipment.

The CHAIRMAN. I think that ought to be very clear, because there has been some question as to where the money was coming from that went to Mount Weather, and it seemed to me that in this bill the language should be so plain that nobody could mistake it, and that is the intention of this item, I assume.

Professor MOORE. That is true, Mr. Chairman.

The CHAIRMAN. If that is true, and nobody has any further suggestions to make in regard to the station at Mount Weather, we can come back to the point where we left off on page 6. We had reached the point in the note of item No. 4, "for about twelve additional printers for work in connection with the issuing of weather maps in printed form."

Professor MOORE. Yes. We are printing the weather maps now in a neat form at about 27 out of the 107 stations. At the other 80 stations we are issuing them by a mimeograph process that is hardly creditable to the Government. I would like to gradually replace those imperfect charts and that unsatisfactory printing with a printing press and a trained printer, and for that purpose we are asking for 12 additional printers.

Mr. POLLARD. At \$1,000 a year?

Professor MOORE. Yes; at \$1,000 a year. Under the present Departmental regulations they can pay \$1,200 when they have completed five years of good service. In some exceptional case we may disregard that rule, as for instance in San Francisco, where we could not fill the place recently until we put the salary up to \$1,200 because of the great cost of living there.

The CHAIRMAN. Under item No. 5 you provide "for salaries of employees in the evaporation work, in connection with the Salton Sea problem."

Professor MOORE. Yes.

The CHAIRMAN. Is it not true that one of the other bureaus of the Department has been measuring that evaporation?

Professor MOORE. Not systematically. The Irrigation Service had put out a few gauges to measure it.

The CHAIRMAN. Have you anybody employed there now from this bureau?

Professor MOORE. No, sir; not now.

The CHAIRMAN. If you should send observers there now, would the men employed by the Irrigation Service be relieved?

Professor MOORE. Yes. The Irrigation Service and the Geological Survey joined in a request, and you will find that in my annual report there is printed a report by a board which was initiated by the Geological Survey and the Irrigation Service, in which they asked us to name a representative, and that board, as you will see in my report, recommends that all this study of evaporation be turned over to the Weather Bureau.

The CHAIRMAN. It would seem, offhand, as if men trained in the irrigation work would be better equipped to handle this business than your observers.

Professor MOORE. No; they are not trained in this problem at all; only here and there they have put out a few stations. The Weather Service is the one which by their own statement here is best fitted to study the problems of evaporation. We measure the rainfall and the snowfall of the various watersheds that come into these reservoirs that they are intending to construct. I will try to tell you briefly about one instance of this. Many of these reservoirs have been constructed, some of them too large and some too small, because they have not understood and because they have had no good formula for determining what the rate of evaporation may be under the conditions right over that area where the water flows. An illustration is the case of the Sweet River reservoir, in southern California. It was constructed too large, so large that for a considerable portion of the time there is no water in it at all, because the evaporation is much greater than they supposed, because they used an old and imperfect formula. So there is a great waste of public money.

In other great reservoirs they have not taken advantage of all the rainfall that takes place; that is, they might have had twice as much water, but they have not made provision for it because of their entire ignorance of what was going to be lost by evaporation. You can not say, "Here in this region we know there is such a heat and such an average movement of the air, because if you move that reservoir and put it down a little bit lower than the other place, and get a little bit less movement of the air, you get an entirely different amount of evaporation." Now, what we propose to do, and what the Irrigation

Service especially asks our Bureau to do, and what the Geological Survey asks our Bureau to do, is to make use of this wonderful opportunity of the Salton Sea, and to study the problem while that sea is disappearing. There is little inflow. The sea, the surface of which lies 240-odd feet below the surface of the sea level to-day, is 200 miles long and 45 miles wide. They have asked us to start this observation over the center of that sea, on the windward side of the water, and on the leeward side of the water, and for the first time in the history of irrigation problems, to get a scientific study of the problem of evaporation in an arid and subarid region, which is so important to the study of almost every economic problem that has to do with the improvement of arid and subarid regions.

Before the committee adjourns I would like to call the attention of the committee to the first report of the meteorological station at Mount Weather, several copies of which I have here.

At 12 o'clock m. the committee adjourned until to-morrow, Tuesday, January 14, 1908, at 10 o'clock a. m.

HOUSE OF REPRESENTATIVES,
Tuesday, January 14, 1908.

The committee met at 10 o'clock a. m., Hon. Charles F. Scott (chairman) in the chair.

**STATEMENT OF PROF. WILLIS L. MOORE, CHIEF OF THE
WEATHER BUREAU—Continued.**

The CHAIRMAN. We will resume the consideration of the appropriation bill where we left off yesterday. I believe Professor Moore was discussing the problem of the Salton Sea evaporation, and had stated, as I recall, that a committee made up of various chiefs of bureaus in the Department of Agriculture and in the Geological Survey and the Reclamation Service had decided that perhaps the Weather Bureau was better equipped to measure the evaporation from that lake than anybody else.

The question that I would like to hear a word or two upon, Professor Moore, is your judgment as to the value of that work. The thought I have in my mind is that the evaporation from a given body of water depends so completely upon the conditions surrounding that particular body of water that to measure the evaporation from the Salton Sea, for instance, might not furnish any basis for an accurate estimate of the evaporation that might take place from a reservoir, say in the Gila Valley in Arizona. I would like to have your opinion upon that.

Professor MOORE. Your statement is correct, Mr Chairman, that the simple measuring of the evaporation in the Salton Sea, to determine the loss every year there, would be of no value to the engineer in constructing a reservoir only a few miles away from the Salton Sea; but that is not the problem we are really after. What we are endeavoring to do is, with a given wind velocity and a given temperature of the air and water and a given aridity of the air, then to evolve a mathematical formula which will enable the engineer to go to any other region where any one of the terms of this formula are different and know what the result will be. It requires a scientific discussion of very great length and by an expert to explain this fully.

When the engineer has this formula to work with he will be enabled to go into an entirely different region from that of the Salton Sea and get a very close approximation of the amount he is going to lose by evaporation.

A few years ago I would have said that this inquiry would not justify the expense, but to-day, when the Government is spending so much on irrigation, and in the endeavor to introduce economic plants into these arid regions, I think the Weather Service would be justified in making a study of all the problems of evaporation in order to get a formula by which the rate of evaporation might be determined. But we are now specifically endeavoring to get a formula by which the irrigation engineer may work, by which the reclamation engineer may work. As I said yesterday, some of these reservoirs have been constructed so large, that is, the superficial area from which evaporation takes place is so great, that there have been millions of dollars wasted through exposing too much surface to the process of evaporation, which would not have occurred if the engineers had had any reliable data to fall back upon as to what evaporation would take place under certain conditions of wind velocity and under normal temperature. If they had had those data they could have constructed those reservoirs with better judgment and more economical construction. There probably is not a reservoir to-day built that could not have been altered in its dimensions, and economically altered, if they had known well about the laws of evaporation. I do not mean to say that we are going to get perfect results, but pretty close to it. Now it is the wildest guesswork, using the formulæ which they have. When they are tested at all, it shows that they are absolutely useless. It will take probably \$25,000 to carry on this work for the year, and the second year it will probably take \$10,000. Three years, I should judge, would be the extreme limit they would have to go on with this work.

The CHAIRMAN. You have estimated \$15,000.

Professor MOORE. Twenty-five thousand dollars; \$12,000 in one part of the bill and \$12,000 or \$13,000 in another part.

Mr. McLAUGHLIN. Is not that condition out there so unusual that if you do work it out it will not be helpful to you in other conditions?

Professor MOORE. That is the point I want to make plain. It is an unusual opportunity to study this problem; there is no doubt about that. But the measurement that we will make on this sea and around about it, as I said before, will give us data that will apply to any other region. It is one of the most difficult problems that the meteorologist has to encounter, the problem of evaporation. You will realize that when I tell you that at none of our stations have we evaporimeters automatically working, for the reason that we have never yet been able to devise one that would automatically record the evaporation, and the amount of it. We have to do this mainly by eye observation, by keeping men observing every hour out of the twenty-four.

Mr. McLAUGHLIN. Is not that a situation and condition peculiar to itself?

Professor MOORE. Yes.

Mr. McLAUGHLIN. That is, there is no other situation in the country just like it?

Professor MOORE. Oh, there are numerous places in the subarid and arid West that have quite similar conditions; not similar conditions, but they will have similar conditions when reservoirs are constructed. This work is intended to benefit other portions of the public service. Personally we are not so much concerned in it, any more than that they would like this scientific problem worked out for their benefit. They have asked us to do the work.

The CHAIRMAN. Have you any stations there now?

Professor MOORE. None on the Salton Sea.

The CHAIRMAN. Who has?

Professor MOORE. We did a little preliminary work at Reno (one of our stations) on evaporation last summer.

The CHAIRMAN. There are stations there. Whose stations are they? Has the Reclamation Service any stations there?

Professor MOORE. I think not. I could not answer that. I presume the Reclamation Service, where they are doing quite a good deal of work, will probably make quite a good many observations of evaporation.

The CHAIRMAN. You can assure this committee that wherever there is a provision for this work, and it is done, there will be no duplication of work done by others?

Professor MOORE. No; because whatever they are doing they will turn over to us. I do not know that I should use that \$25,000. I am groping a good deal in my estimate on this work. I am frank to say that \$25,000 is ample for the work, and if we should turn back part of it, it would not be the first time we have turned back part of the money that you have given us.

That reminds me that somebody asked me yesterday about that contingent fund, and I find that we turned back \$81 last year of that fund. That fund was exhausted, and the need for an increase there is due to the fact that the central office has grown during the recent years, and the price of materials has increased from 33 to 50 per cent, and the fund is not now sufficient. That is the reason for asking for a small increase of that fund.

Mr. LEVER. On that matter of evaporation, has your Bureau ever conducted any experiments showing the effects of the denudation of forests on rainfall and climatic conditions?

Professor MOORE. We have conducted some researches in the last few years up in Wisconsin, and they are going on now, with a view of learning what is the effect of the surface covering on the air temperature immediately above, and we have gotten some perfectly startling results. I have heretofore taken the position that the denudation of the country of forests had no effect upon the temperature or the rainfall—that is, an appreciable effect—but that the denudation did have an effect upon the conservation, that is, upon the economical use of the rainfall; there being little to hold back the water, to restrict the run-off, and less of the rainfall being absorbed, there is less water to supply the streams during the period of drought.

As a result of the investigations we have carried on in Wisconsin in the past few years, and the investigation I myself carried on a few years ago, I have found that taking two surfaces on precisely the same level in adjoining fields, not a thousand yards separated, one of them covered with a thick vegetation and the other covered 2 inches deep

with sand, I have secured as much as 9° difference in the minimum temperature of the two places, and an average during the cold nights which I can not give you exactly now, but which is between 5 and 7°; enough to make a marked difference in the formation of frost.

Mr. McLAUGHLIN. At what elevations?

Professor MOORE. Precisely the same level. In these experiments you will find that in the lower spot you will get frost, and the higher spot will be without frost, and my effort was to determine how much the surface of the earth had to do with the temperature immediately above it. I found that in some cases the minimum temperature 50 feet above the ground would stand at 50° to 52°, while within 10 miles, for instance, out in the open country, on a surface covered with vegetation, the temperature fell to 24°. There was a difference of from 24° to 28°, the result of surface covering.

Now, we are forced to this conclusion, that the temperature of the air that is nearer the surface of the earth partakes very largely of the temperature of the earth itself, that it is warmed or cooled by the earth itself. Most frosts occur with the temperature above the freezing point. So this research, showing such a marked difference in the temperature over a denuded surface, and a surface covered with vegetation, in their effect upon the air itself, is rather forcing me to the conclusion that the denudation of the forests does have or may have—I will put it that way, may have—an appreciable effect upon the climate. We do not know yet.

Mr. HAWLEY. Does it make any difference whether it is covered with grass, or small undergrowth, or brush, or tall trees?

Professor MOORE. Not very much. The more perfect the vegetable covering, the cooler is the region. It has the effect of lowering the temperature of a region and modifying its extremes of heat during midday. Now, I am not saying that the climate of the country has been altered at all by the denudation.

Mr. LAMB. If you go up in Hampshire County, W. Va., you will find that they are clearing off the mountain tops and raising peaches up there.

Professor MOORE. Yes. These experiments in Wisconsin indicate that where a man wants to locate a fruit farm or a vegetable farm, he should have a careful survey made at different levels around about, during the fall and spring, to determine the climatic conditions and the direction and force of the air drainage. I have a farm out here, and I have measured it all over carefully, and I am putting in fruit there now, and I shall grow fruit where I will never have frost unless the air temperature gets down to freezing. I am studying the air drainage as carefully as you would study the courses of the water on your land. You will remember that cold air is heavy and will flow just like water.

Mr. LEVER. Suppose we had an area covering, say, 50,000,000 acres of land, elevated somewhat, and covered with forests, and later those lands should become denuded of forests, the forests should be cut down. What effect, in your judgment, would that have upon the climatic conditions, the temperature, and the rainfall?

Professor MOORE. It would surely have an effect upon the flow of the springs. The springs would have a less flow during the mid-summer. There would be a great erosion of the soil, because the water would flow away quicker, not being restrained by the trees and the stumps, not being caught by the foliage and allowed to trickle down slowly. The effect on the climate, as I have said before, might be appreciable. I do not know. I am rather inclined to think it would be. It would be determined entirely by the area involved. You gave me an area. It is hard for one to picture in his mind the magnitude of an area.

Mr. LEVER. That might include half a dozen States, perhaps.

Professor MOORE. That would affect the climate, undoubtedly. It would be hotter in summer and colder in winter.

Mr. LEVER. And what effect would it have upon the rainfall in that region?

Professor MOORE. Well, it would probably slightly decrease the rainfall. It would have a tendency to decrease it. The tendency would be to decrease the rainfall, if there was any effect, and I am inclined to think, from our recent experimentation, that there would be an effect.

Mr. POLLARD. Would it be material?

Professor MOORE. That would depend upon the area it affected. Now, I am answering offhand here as to a problem concerning which the area should be carefully considered and the climate of the region already existing should be carefully considered, and so my answer must not be given too much weight; but from the area you have mentioned, I think the change in the rainfall would be appreciable.

Mr. POLLARD. Is not that upon the assumption that all of the forests would be removed, that the country would be denuded entirely of foliage?

Professor MOORE. Yes; that is upon the assumption that the foliage would be entirely removed. Here is one thing that people fail to take into consideration, that when you remove the forests you do not take away all vegetation. You put another kind of vegetation there. It is not as thorough a protection as the forest, but it is a protection. You break up, moreover, the soil, and make it permeable, and it is washed away, and it goes down and fills up the beds of the streams. That would not otherwise occur.

Mr. POLLARD. When the forest is cleared away and a new growth of forest starts, would it not have an adverse effect on the decrease of rainfall? In fact, would it not have the effect of increasing the rainfall?

Professor MOORE. If the area were great enough it might have a tendency to increase the rainfall.

Mr. POLLARD. Even though another growth of trees was coming on?

Professor MOORE. Yes; I say it would have that tendency. Now, this is only my individual opinion, and it should not be given too great weight.

Mr. POLLARD. You are supposing that the forests are all removed?

Professor MOORE. Yes.

Mr. POLLARD. Would the elevation have any effect on the rainfall? Suppose the elevation were 3,000 feet in one place, or it should be

6,000 feet in that same place, under other conditions, would that cause any different effect upon the rainfall?

Professor MOORE. It might. It would be hard to answer that.

Mr. LAMB. It would depend also upon the soil. The limestone soil would not reproduce so quickly, but this soil on the Atlantic coast reproduces very quickly right along.

Mr. LEVER. Is it not a fact that the heaviest rainfall in this country is found in the regions that have heavy forests?

Professor MOORE. Well, the forests might be the result of the rainfall, rather than the cause.

The CHAIRMAN. I note here you have an estimate for the pay of employees engaged in seismological observations. May I inquire why it is those observations could not be made by your regular observers at stations already established?

Professor MOORE. They could, Mr. Chairman, if we were not imposing upon them too much additional work. Our observers are competent, with a little preliminary instruction, to make these seismological observations, but each instrument must be very carefully installed, and it requires a great deal of care. If I continue to add, as I have for several years past, to the work of the local observer, we will get him so loaded up that he can not carry the burden. If I put this work upon these stations, I have too few men to take charge of it.

The CHAIRMAN. Have you decided where you will probably locate these special stations?

Professor MOORE. No; not as yet, except that we would pick places where we own buildings. We would put about 10 out, and I presume sometime 10 more—I should think 10 would be enough—so that when earth vibrations come we could measure their progression across this continent by a system of stations that would simultaneously record them. Probably the centers of these great disturbances, the vibrations of which come here, are off in the ocean somewhere. We would determine the usual motion of these earth waves. We would give the engineer what he must have in the future—the data on which he can construct earthquake-proof buildings. San Francisco would have had no disaster, and probably no loss of life, if her buildings had been properly constructed. If the engineers had known the usual directions from which these waves move—the to-and-fro movement and the upward-and-downward movement—they could have constructed buildings so that they would have been earthquake proof. We would have had the data from which we could have given them knowledge if we had put a few instruments at our stations several years ago. There is coming a time when all our great congested centers of population will have municipal regulations requiring that large buildings shall be put up so that they will withstand earthquakes.

The CHAIRMAN. Is there any uniformity about the motion of earthquakes? Does not each have its individual motion, and is it not impossible to detect what that motion is until it is over?

Professor MOORE. There are certain weak places in the structure of the earth where gravity is at work, and there is a gradual readjustment of the surface, and as that readjustment is going on the earth waves are sent out, and it is probable that for centuries to come we will find these centers of activity very much in the same

region, because the continents are being worn down by the action of the rainfall and the freezing and thawing and floods, and there are being displaced great quantities of matter from the continents which are going down into the ocean beds. That will continue from the same source to the same place, so I imagine that we will find that the centers of disturbances will be pretty much in the same regions. We would learn in course of time where the waves come from, and about what is the extreme movement that the engineer would have to protect against; if he knows what to protect against he can construct buildings that will withstand the force of most earthquakes.

Mr. HAWLEY. Would it make any difference to him from which direction the earthquake waves came?

Professor MOORE. Yes. That is what we want to know. This is not a meteorological problem. We have nothing to do with this problem, theoretically. We have an organization with trained observers, and we could get these records cheaper than the geologists could get them, because they would have to establish stations and send out men and have offices, and it would cost probably \$200,000 for them to get what we will give to them for, say, \$25,000 or less.

The CHAIRMAN. How much would it cost you to equip one of your bureaus with the additional instruments necessary to make these observations?

Professor MOORE. I presume it would take a thousand dollars to equip a station well. There are no perfect seismological instruments. Professor Marvin has developed some efficient apparatus, starting with Mille's instruments. It requires two instruments to measure the motions.

The CHAIRMAN. Is your estimate here of \$10,000 chiefly for the cost of putting in the instruments, or does it contemplate the employment of additional observers? This item is on page 6 of the bill.

Professor MOORE. That is for salaries.

The CHAIRMAN. Then you expect to get the money to equip the stations out of your other funds?

Professor MOORE. Yes; you will find a like sum under general expenses.

Mr. McLAUGHLIN. Do I understand that this is altogether a new service?

Professor MOORE. Entirely new.

Mr. BEALL. Do you think any practical benefit will come from this outside of the satisfaction that it gives to learned men to know something about it?

Professor MOORE. No; this is not for learned men at all.

Mr. BEALL. Do you think that it would have any practical beneficial effect?

Professor MOORE. Yes; the modern buildings might be constructed so that they would not fall under the shock of an earthquake.

Mr. BEALL. These steel buildings are now supposed to be defective?

Professor MOORE. This is a case where other scientific bureaus and other interests have asked us to make these measurements. We are not really concerned in it. It is for you to say whether we shall do it. We are satisfied to do the work if you want us to do it, and we are satisfied if you do not want us to do it. We have estimated, as you

will see there, for about 10 stations. The committee might think it not desirable for us to take up the work at all. That is our suggestion. You might increase it or decrease it, provided you want to do it at all.

The CHAIRMAN. My opinion is that if we put in these automatic instruments in stations already established it ought not to be necessary to employ additional observers. I do not see why one man should be needed to watch an automatic instrument.

Professor MOORE. There is a good deal of work connected with the care of these instruments. I will say this to the committee on that line, that it would not require the full time of a man. As I say, practically every one of our stations is worked up to the limit, and while our regulations do not permit them to work more than the legal time, yet actually, of their own volition, the men are working far over the legal time. We do not require it and the regulations are against it, but the men are actually doing it to keep up with the work. I feel a hesitation in putting more work on these stations, requiring more of the men, and yet I admit that the work does not require the full time of a man. I thought at the stations that have the most work I would put a man, and at the stations where the work is not so hard I might put an instrument in and not put a man in. It is just a question of how much work I can impose on a station.

The CHAIRMAN. I think you would find it pretty easy to find stations where instruments of this kind could be put in without putting a man in.

Mr. WEEKS. Does the law limit the hours that an employee must work at a station?

Professor MOORE. Oh, yes; eight hours is the legal limit, and our regulations provide eight hours—not to exceed eight hours. But of their own volition I know that our men work over that. We do not seem to be able to cut out any of the work we are doing. I have letters coming from the boards of trade, from the cotton exchanges, and the transportation lines, both marine and continental, continually demanding more and fuller Weather Bureau reports. They all say that they want our reports. Pretty much every town in the country comes in and wants a Weather Bureau station. I tell you, I am more concerned about holding down the growth of the Weather Bureau than I am in coming here and getting appropriations. The expenditure will be justified wherever it is made.

The CHAIRMAN. Yesterday, in the discussion of the propriety of building a station at Dodge City, Kans., you took up the language in this paragraph on page 7 and gave us to understand that the \$15,000 asked for here is intended for expenditure at Mount Weather, and is all the money that you expect to expend there this year outside of whatever appropriation may be given to replace the old building.

Professor MOORE. Yes; to replace the administration building; that is true.

The CHAIRMAN. Then if no member of the committee has anything further to ask we will pass that.

Professor MOORE. The estimate for the replacing of the burned building was sent to the Secretary of the Treasury, and it came to the House Saturday, I believe.

Mr. RUCKER. Is there any appropriation to erect any building at any other point, except where this fire occurred?

Professor MOORE. No; the estimate as it now stands provides only for the completion of two buildings that were left uncompleted, and there is a supplemental estimate sent here to replace the burned building.

The CHAIRMAN. When these buildings are completed at Mount Weather will you then have your plant finished so far as buildings are concerned?

Professor MOORE. There are two buildings there now that are almost completed. Then there is a supplemental estimate to restore the building which was burned, and in restoring it to create a central power plant, so as to have only one steam plant. When that is done, everything that we had in contemplation for this experimental station, which is the only station out of 200 where we make experimentation, will have been completed, except that in a year or two we would probably want a small observatory building to carry on research in regard to the quantity and the various conditions of light—in other words, to determine the absorption of the sun's rays by our own atmosphere; it is very interesting and important. We want to study the quantity of heat that our air absorbs, instead of merely studying the temperature of the earth. Langley, in some of his experiments, has indicated that the sun does not always radiate the same amount of heat; that the radiation varies. We do not know. We do know that there is a variation in the temperature of the earth's own atmosphere, and that such changes in temperature here at the surface are due to the motions of the air. If it were not for that, the first day of January would always be of the same temperature. We would always have the same temperature on the same day of the year, because on a given day of the year the rays of the sun would fall at a given angle on the surface of the earth at a given latitude. Our weather is due simply to the dynamics of the atmosphere; it is due to the rolling and tumbling of the atmosphere not over 6 miles in depth. Above that everything is serene, or moving in the same direction.

Now, we want to study this 6 miles of atmosphere in a way in which we have not studied it before. I do not promise this committee, if you give us this building at Mount Weather, that we are going to come back here next year or the year after that or the year after that and give you results that you can apply at once. We are studying physical problems. We are the only people who are qualified to study them. We are studying an imperfect science. If you want to remain quiet and not study this science which is back of our art of forecasting, very well. If we do so, it will increase our burdens and responsibilities; but we are interested in this work; with most of us it is our life work; but we want to do the work that you want us to do. We can not expect to improve the meteorological service of this Government, on which we are spending so much—a service that, according to the testimony of the scientists the world over surpasses in efficiency that of all the rest of the world—unless we experiment. If you want us to go ahead improving in ability, we must spend something on one experimental

station. How can an experimenter go out and say "I am going to discover something wonderful?" We do not promise that, but we do promise this, that we will never make an improvement in the accuracy of our forecasts, we will never gain any further efficiency in our service, unless we do study, unless we do make researches, unless we do try, and we can not make the researches and make improvement unless you give us authority to experiment at this one station. That is going to put an expense of probably \$25,000 a year, for all time, on the people.

Mr. LAMB. May I ask you how this salary of your engineer compares with the salary of the engineer over at the Agricultural Department? This is on page 6.

Professor MOORE. It is less; and he is a very excellent man. If you go into our boiler room and engine room you will find one of the best kept places in the Government service.

Mr. LAMB. I have been there, and know that it is.

Professor MOORE. I have a magnificent mechanic; there is no doubt about that.

Mr. LAMB. He gets \$1,200?

Professor MOORE. Yes.

Mr. LAMB. What does the engineer of the Agricultural Department get?

Professor MOORE. Either \$1,400 or \$1,600.

Mr. LAMB. Do you know what other engineers get in the other Departments?

Professor MOORE. They get more than our man does.

Mr. LAMB. Then, if there were an increase asked for him, it would meet with your approval, would it?

Professor MOORE. It would meet with my very hearty commendation, because I have not a more efficient man around the building.

Mr. HAWLEY. Here is a provision for one captain of the watch at \$1,800.

Professor MOORE. That is the man who performs the same functions over there.

Mr. HAWLEY. You have a captain of the watch separate from the engineer?

Professor MOORE. Yes.

Mr. HAWLEY. This man in the Department of Agriculture performs both services. This is on page 2.

Professor MOORE. That may be. I do not know. I will tell you about the engineer of the Department. That plant does not run twenty-four hours a day like ours does. We have our printing office, and we heat and light the Weather Bureau plant, and we run that plant night and day. You see, our business runs every night in the year until midnight, and every Sunday and every holiday. There is not a day of the year that I am not on duty. There is not a day in the year that I do not get reports by telephone or telegraph or mail.

Mr. WEEKS. How many of those skilled mechanics are carpenters and how many are painters?

Professor MOORE. You mean the five skilled mechanics at \$1,000 each? We have two carpenters, and there are two instrument makers and one machinist. There is one machinist in the press room, and

there are two who are carpenters. We want one additional mechanic, a painter, to keep up the work.

The CHAIRMAN. That matter was discussed, I believe, yesterday.

Mr. LAMB. Yes.

Professor MOORE. We have asked for a small increase in the office force. There is always an increase in the work. I have based my claim on the ground that we are using less men at the central office than was used thirteen years ago. We had over 200 men in that office thirteen years ago, and now we have only about 180.

The CHAIRMAN. The only other changes on page 7 are the evaporation and seismological investigations, and those we have already discussed. I would like to inquire how many maps and publications are sold under the authority given in the latter part of that paragraph. What is the demand for them?

Professor MOORE. For the fiscal year beginning July, 1906, the total sales were \$825.11. I have a detailed statement here, if you wish to see it.

The CHAIRMAN. I do not care for the detailed statement, but, in a general way, what was that for, Weather Bureau maps or other publications?

Professor MOORE. There was very little in that for Weather Bureau maps; it was almost entirely for Weather Bureau publications, bulletins, and special reports, for which a price is charged. There are very few people who pay for the daily weather maps.

Mr. BEALL. On an average, from one of these stations where you have observations, how many reports do you send out over the surrounding country? To how many points do you ordinarily send those reports?

Professor MOORE. I have started to send letters to the various Representatives showing what reports are distributed in each district. I have been signing about 25 or 50 of those letters a day for several days. It seemed to me to be a good thing that the Representatives should know where we are making distributions, and from what centers we are distributing. You should have received one of those letters.

Mr. BEALL. I have not received one. Just take the point of observation; about how many miles surrounding that are these reports sent?

Professor MOORE. It will depend upon how many can be reached. Take, as an illustration, Columbus, Ohio. There the places that can be reached by mail before evening of each day will receive the weather map from Columbus, Ohio, unless that would encroach on the territory of Cleveland or Pittsburg, one of which might reach that place earlier. We have these stations get together and compare their lists and eliminate duplications, and we have the maps come from the center that can reach the place the quickest, according to the mail service. It is all carefully worked out. Now, take a small station like Macon, Ga., for instance—a small station, with only a man and a messenger. He will reach all portions of the State that can be reached with his map at times when the map will be of some use, and nothing more. He will mail out postal cards to the postmasters. He will send them into his own town, where a good dis-

play can be made. Here is a statement as to the distribution of special forecasts and special warnings. There are, at Government expense, 2,282 forecasts distributed by telegraph every morning. By mail there are 78,000 distributed and by rural free service 71,000. By telephone there are a little short of 2,000,000 distributed free of charge to the Government. That is the most general way of distributing the weather forecasts to-day. By railroad service 1,400 places are served each morning, by railroad telegraph 2,000 are reached each morning, without expense to the Government. In the beginning the telephone companies insisted that we should pay them for the transmission of these messages, the same as we pay for the transmission by telegraph companies. It seemed to me that the lines extending into rural communities would get as much benefit as the Government would get if they transmitted these messages. We could not see why we should pay them, and we stood our ground and there was quite a contest over it, and finally we got one big company to say to the people, "We will send the frost warnings and cold-wave warnings to you free of charge. Call us up and you can get them any time." Then we would telegraph to the centers of that company, and they would have that information and send it out, and it made a large increase in their rural subscribers, so that the problem was solved, and to-day there are 2,000,000 subscribers getting our forecasts every morning.

The CHAIRMAN. Have you there, and can you give us, the expense of telegraphing last year?

Professor MOORE. No; I have not it here, but I can tell you offhand what it was. It was about \$225,000.

The CHAIRMAN. And how much of the increase you ask this year do you expect to need for this purpose?

Professor MOORE. I think we put in one sum here for that and something else. We lump that with something else, do we not? I had it in my mind that about \$10,000 should be added to that fund.

The CHAIRMAN. You do not itemize it. You simply say that the increase is submitted for various purposes, among them the additional telegraphic reports of forecasts and warnings.

Professor MOORE. I had in mind about \$10,000 that we might use for telegraphing.

Mr. Cook. What is the amount you require for your Bureau for cable service, and for what purpose is the cable service used?

Professor MOORE. During the hurricane season, for six months, we have cable observations from the West Indies. We have about fifteen stations in the West Indies, and the Windward Islands, and two or three stations along the coast of South America, and we cable from the Bermudas, and the Bahamas, and from Turk's Island, and from Hawaii. Then we own several cables.

The CHAIRMAN. You do not pay charges on them, of course?

Professor MOORE. No. We charge for everything on them except the Government messages, and we are paying on the cable service about 12 cents a word. We can send an observation in two or three words—such an observation as we want from these regions.

The CHAIRMAN. Is the rate you pay for the cable and telegraphic service fixed by the General Government service rate, or is it a special rate?

Professor MOORE. We have an arrangement between the telegraph companies and the Secretary of Agriculture concerning that.

The CHAIRMAN. Do you know how that rate compares with the rates paid by other Departments of the Government?

Professor MOORE. I think it is considerably less. I do not know what the other Departments of the Government service pay, but I think we get a much less rate than the other Departments do.

The CHAIRMAN. Is there any particular reason why one Department should pay more for telegraphic service than another?

Professor MOORE. I say I think we get a less rate; but if we do get a less rate for that service, we do very much more business than any other Department. We probably do more telegraphic business, and have it concentrated in a way so that the companies can handle it cheaper, than, probably, from all the rest of the Government Departments combined, unless it be in war times.

The CHAIRMAN. Can you give us, offhand, what percentage of the regular Government service rate you pay?

Professor MOORE. We pay 20 cents for a message of twenty words anywhere in the United States, 1 cent a word, and we pay a cent for each word over. We pay 10 cents for a message of ten words, where the distribution is from a center outward, for a radial distance of not to exceed 300 miles, and a cent a word for each word over. Then we have what we call "circuit reports." Those are reports that are sent through from some big center, like Chicago, all the way to Boston, and every station along the line takes it off, so that by one sending we will distribute a large series of observations to a great many stations at the same instant.

Mr. McLAUGHLIN. For the one charge?

Professor MOORE. No; that is what I was getting at. Then we pay an initial price, I do not know offhand just what, but probably $1\frac{1}{2}$ cents for each word, or possibly 2 cents a word, and then a proportion of that for each station that copies off, and by distributing in that way we are able to make the large distribution as we do make in about thirty minutes. A station comes in and contributes its report to 200 stations, and this report will go in to all of the 200 stations, or to most of them, and the sending station itself will get the observations of most of the others, and that is all done in thirty or forty minutes.

Mr. McLAUGHLIN. Are these intermediate stations required to take them, or do they have to take them as they go through?

Professor MOORE. They have to take them, because they go to the local office and go on the weather map of that station.

Mr. COOK. Do you make an arrangement in this regard with various telegraph companies, or do you make an exclusive contract?

Professor MOORE. After trying to divide the business, and being put to the necessity always of a contest between the agents of different companies as to who should have this message and who should have that message, and the service being delayed while the local managers were fighting it out, I finally got to the place where I said, "I will arrange this so as to get the best service for the Government, and we will not allow you local agents to come into court at all." I reasoned that in order to gather this big system of reports most efficiently I must do it by the largest agent. The Western Union is

the largest company. We simply want to get the most efficient service, and we decide to gather from the stations our observations by the Western Union, provided they have a line there. If they have no line, then we take any other company. When we come to distribute we turn the thing around, and we say, "We will distribute by the Postal, if it have a line." That is the next largest company. If it has no line, we will take any other communication we can get. Then, in case a local man does not give us prompt service, no matter what company he belongs to, I notify the central office, and if they do not immediately remedy the difficulty, then that company, whether it is the Western Union or the Postal, loses that business right there.

That is a rule we have adopted, one of forcing the best service possible on behalf of the Government. The usefulness of our service depends on our getting prompt service. In a large city we put one of our own men in the room of the Western Union to make up our circuit reports, because we have to have an expert to do it. He will go in there for about a half an hour each morning, and attend to the handling and to the distributing of our reports, and to the relaying—that is a better term—of our business. That is during the rush season, in the morning or evening.

The CHAIRMAN. During the hurricane season, when you receive messages from the West Indies and the Atlantic coast, do you make any effort to make warnings to vessels passing along the coast by wireless telegraphy or in any other way?

Professor MOORE. Yes; we are using wireless telegraphy now. That is under the control of the Navy Department. By arrangement, we have our messages flashed out, and any vessels within communicating distance, say 300 miles, will receive the warning. We get communications now from the ocean by wireless, and when all vessels of commerce are equipped with wireless, and when the Government of the United States steps in and exercises its power and every other government steps in and exercises its power to compel every vessel above a certain tonnage to carry an instrument and an operator, and each ship is compelled to transmit all messages received by it, we will get a very efficient service of data from the ocean; but we will not get it until then. In the meantime the competition of different companies will result in detriment and inconvenience to the business of the world for a long time to come, and it can not be eliminated until the governments do step in and control the transmission and receipt of wireless messages. We had a case a few years ago of a ship that was disabled, and sent a wireless message, and it was received by a competing wireless company and was suppressed.

Mr. RUCKER. What is the character of the wireless messages you sent out? Do you locate a storm and show the direction of it?

Professor MOORE. Yes. The message will go out that a storm is centered along the south line of coast, moving along the Gulf Stream, increasing in intensity, and the vessel's master will say, "We will sail around that." When the time comes that we will get observations from the entire Atlantic Ocean by wireless telegraphy, through one ship repeating to another its observations, we will be able to send information to the entire Atlantic Ocean. Messages will be repeated back, from ship to ship, "Storm in such a part of the ocean. All else serene. Sail your course." All ships outside of that region will feel

easy; but everything coming into that region will have to look out. It will render ocean transportation far safer than riding on a street car is to-day.

Mr. HAWLEY. It will decrease freight rates by decreasing insurance rates?

Professor MOORE. Yes. Finally the governments will step in and take control of the wireless-telegraphy systems, as they will have to do before they get efficient service.

Mr. RUCKER. The governments will have to own and operate them?

Professor MOORE. They will have to control them; you can take that either way. They can own them or control them, either way. I think they would do it better if they owned them.

Mr. COOK. What was your answer to the chairman as to the approximate amount paid for telegraph service for the year?

Professor MOORE. Two hundred and twenty-five thousand dollars. If you will allow me to go back for just a word, I should like to return to these maps. I have asked you for 12 printers to print the daily weather map. Here is a daily weather map printed at Little Rock, Ark. That is a very neat publication. It has great value.

The CHAIRMAN. Have you one of the maps produced by the duplicating process?

Professor MOORE. Yes; here is one of the best samples of a map produced by the duplicating process that I have ever seen.

Mr. RUCKER. That is pretty good.

Professor MOORE. That is the best sample I have ever seen of a map produced by the duplicating process. Copies produced by this process become more and more illegible, until after 100 or 200 copies are printed they are very bad.

The CHAIRMAN. The only practical advantage of the printing over the duplicating process is merely in the matter of neatness, is it not, and appearance?

Professor MOORE. In legibility and creditable appearance.

The CHAIRMAN. Has any member of the committee anything further to ask Professor Moore?

Mr. WEEKS. I did not understand, though possibly Professor Moore did state, when he was speaking of that instance in Wisconsin where two areas, one wooded and the other barren, whether he determined whether there was any difference in the amount of precipitation on those areas?

Professor MOORE. No; we did not measure for that. I want to read a few lines from an editorial in the Buffalo Enquirer of December 14, 1907:

Considering the few marine disasters and the comparatively small loss of life in connection with handling the gigantic fleet on the great inland seas, one can but commend the indispensable part played by the Weather Bureau. Not a single storm worthy of note passed over this end of Lake Erie during the season of navigation without ample warning, and in fact the character of vessels most likely to be affected by the storm were noted in the warnings.

That is just one of thousands of comments we get from newspapers published at different marine ports. We make warnings of storms destructive to commerce with far greater accuracy than we can

make predictions of rain and snow; yet the predictions of rain and snow are all that you see in the daily papers. These warnings of storms go direct to the mariner, and are given by flags, and by special bulletins put into their hands. The most valuable part of our work does not appear in the papers at all.

Mr. RUCKER. What is your per cent of error in predictions?

Professor MOORE. Twelve to 15 per cent of error in the general forecasts you see printed. Just stop to think of that. Twelve times out of a hundred you can criticise the Bureau if you want to, and if you look only at the errors you might think it was not worth very much; but the man who is in business, the man who is shipping, can take that and say, "I can afford to work on that when I know that the error is 12 per cent." He has learned to discount the element of error and goes ahead and uses it in his business. The people living around and near great streams that are liable to overflow can use our warnings, for there we do not make 12 per cent of errors; probably we do not make 5 per cent of error.

The CHAIRMAN. That is the average for the stations from all over the country?

Professor MOORE. Yes.

The CHAIRMAN. And it is true that in some of the stations the percentage is higher and in some others it is lower, is it not?

Professor MOORE. Yes.

The CHAIRMAN. Is it not much more difficult to forecast accurately the weather in Washington than in Kansas City, for instance?

Professor MOORE. Neither one of them is an easy place.

The CHAIRMAN. I mentioned Kansas City because it is in the interior of the continent and perhaps not subject to such sudden changes.

Professor MOORE. Mr. Chairman, I would like to ask you to cut out, on page 4, the word "climatologist." You see the title there "librarian and climatologist." That does not describe the duties of that man. That climatological work is being done in another division, and he is not really doing such work.

The CHAIRMAN. Is not \$2,000 rather a high salary for a librarian?

Professor MOORE. I think not. The librarian of the Weather Bureau is an expert meteorologist. What he really does is to handle all examinations of the Weather Bureau. He is a highly developed man. We have examinations for each advancement in our service, theoretical tests, tests of a man's knowledge of the different text books. This man does that work, and he is a high-grade man. He is not really doing climatology; he is doing examinations of the Service, and that is why I would like to have the statutory title of the place changed, to conform to the duties.

Mr. POLLARD. What would you substitute for the word "climatologist?"

Professor MOORE. You might call him "librarian and examiner." That would be better than "librarian and climatologist." His principal duty is really in charge of the library.

The CHAIRMAN. What does he examine, or whom does he examine?

Professor MOORE. He examines all the people in the Weather Bureau for advancement. He is an all-round man, and a high-grade man. I at least want to cut out the word "climatologist." There was

a time years ago when the librarian did work in climatology, but that is a large work and is done in the climatological division, and it is a misnomer to have him so designated.

The CHAIRMAN. Are there any other items to which you would like to call our attention?

Professor MOORE. I think there is nothing more.

The CHAIRMAN. Is there anything further that any member of the committee would like to speak to Professor Moore about?

Mr. McLAUGHLIN. There was one man whose salary you spoke of raising.

Mr. LAMB. That was the engineer.

Mr. McLAUGHLIN. Which man was that?

Professor MOORE. That is on page 5, one engineer.

The CHAIRMAN. It is hardly fair to say that Professor Moore recommended that. The gentleman from Virginia called attention to it.

Mr. LAMB. The record will show what Professor Moore said.

Mr. RUCKER. Do you have specific or general authority to recommend the promotion of men in your office?

Professor MOORE. I recommend, but the Secretary must approve. The authority is vested in the Secretary. The procedure has been, in times gone by, to add to the appropriation for the different stations, and then I have recommended to the Secretary and he has approved. The action then devolves upon the Secretary to create new stations.

There is nothing more I have to say, Mr. Chairman. There is only one thing in which I am deeply interested, and that is in replacing the building that was burned at Mount Weather.

The CHAIRMAN. That appropriation will not come before this committee.

Professor MOORE. It was referred to this committee on Saturday, I understand. It is so printed in the record.

The CHAIRMAN. This committee could not take jurisdiction of that. It is a deficiency, I understand, and it would have to go to the Committee on Appropriations.

Mr. BEALL. You have spoken of proposed increases all along. Is there anywhere along the line where there can be a reduction made in your department?

Professor MOORE. There could be a reduction.

Mr. BEALL. Without serious crippling of the service?

Professor MOORE. No; there is not—that is, according to my opinion.

The CHAIRMAN. We are greatly obliged to you for the information you have given to this committee.

At 12 o'clock m. the committee adjourned until to-morrow, Wednesday, January 15, 1908, at 10 o'clock a. m.

HOUSE OF REPRESENTATIVES,
Wednesday, January 15, 1908.

The committee met at 10 o'clock a. m., Hon. Charles F. Scott (chairman) in the chair.

The CHAIRMAN. As announced yesterday, we will take up this morning the Bureau of Animal Industry, and Doctor Melvin has been kind enough to come before us to answer any questions we may have to ask. I think perhaps it might be proper for me to say at this time also that we are honored by the presence of the Secretary of this Department, who comes upon the invitation of the chairman of this committee to be present at as many of these hearings as his official duties will permit, and I have his authority to say that he is here also to answer any questions which any member of the committee may wish to direct toward him at any time.

STATEMENT OF ALONZO D. MELVIN, CHIEF OF THE BUREAU OF ANIMAL INDUSTRY, DEPARTMENT OF AGRICULTURE.

The CHAIRMAN. Doctor Melvin, I believe we could best make progress with your Bureau if you will take up the changes in your appropriation as they appear here. I notice first an increase of \$250 for your chief clerk. What have you to say in regard to that?

Doctor MELVIN. We considered that proper in view of the greatly increased duties of the chief clerk. The increase in his duties is largely on account of the extension of the meat-inspection service, his salary remaining heretofore as it has been for a number of years past.

The CHAIRMAN. How long have you had your present chief clerk?

Doctor MELVIN. He has been acting in his present capacity, I think for about five years.

The CHAIRMAN. How long has he been serving at his present salary?

Doctor MELVIN. About five years, I think. He has been an employee of the Bureau, though, for twenty or twenty-five years, all together.

The CHAIRMAN. In the next item you add the words "and compiler" to the title "one editor and compiler," and submit an increase of \$100. Why do you desire the title changed?

Doctor MELVIN. It is not altogether material whether the title is changed or not. In adding the word "compiler," we thought that would perhaps more nearly describe his duties than the word "editor" alone; but that feature is not so material. We look upon the increase in salary as of more value than the change in title.

The CHAIRMAN. Has any additional duty been imposed upon him this year?

Doctor MELVIN. Nothing distinct or different from what it has been before, except that it has increased in volume as our work has increased.

The CHAIRMAN. How long has he been receiving \$2,000?

Doctor MELVIN. I think about three years; since he has been acting as editor. He replaced Mr. Thompson, whom I think you knew, who was our former editor. Mr. Thompson died.

The CHAIRMAN. Yes; I knew Mr. Thompson. His duty, I suppose, is to revise all the manuscripts that come in from the Department, and prepare them for the printer, and oversee their publication?

Doctor MELVIN. He goes over this manuscript and prepares it and gets it in shape by conferences with the authors, and it is then presented to the editor of the Department. It does not go direct from him to the printer, but to the editor of the Department. Also, in his office a considerable number of our publications are compiled, particularly in the way of statistics, and information of that kind.

The CHAIRMAN. Has he any of the functions of a censor, or does he submit what is brought before him?

Doctor MELVIN. He does censor these things, to some extent. Of course it would not be supposed that he would arbitrarily, nor has he the power to arbitrarily, change any of this manuscript; but if he found any of it that appeared to conflict with any other work, or with other branches of the Department, he would either take that up with the author or with me, and in that way it would be adjusted.

Mr. LEVER. How does this salary compare with the salaries of other men in other Departments doing similar work?

Doctor MELVIN. I have not compared this with the salaries paid in other Departments. I think in our Department it is about on a par with what men doing a similar class of work are getting.

Mr. LEVER. That is, \$2,100 would be?

Doctor MELVIN. I would think so; yes.

The CHAIRMAN. You next submit an estimate for an additional clerk at \$2,000.

Doctor MELVIN. Yes. That is to provide for a high-class clerk that we need in our work.

The CHAIRMAN. Would he be an assistant to the chief clerk and to the Editor or where would his services be needed?

Doctor MELVIN. His work would be more as an assistant to the chief clerk and in keeping closer record of the finances of the Bureau; work on our estimates, our liabilities, and work of that character.

The CHAIRMAN. Have you some one who is doing that work now?

Doctor MELVIN. Yes.

The CHAIRMAN. What salary is he getting at this time, this man who is now doing that work?

Doctor MELVIN. Eighteen hundred dollars.

The CHAIRMAN. And this proposes to promote him, I presume, and let his present place on the roll be filled by somebody below him.

Doctor MELVIN. Yes; exactly.

The CHAIRMAN. How long has the man now employed in this work been getting a salary of \$1,800?

Doctor MELVIN. He was transferred from the Treasury Department, and he has been with us about two years; not quite two years.

The CHAIRMAN. The next change, I believe, is on page 8 of the estimates, in the item providing for three clerks, at \$900 each, an increase of one.

Mr. HAWLEY. There is another change in the footnote, one clerk at \$900.

The CHAIRMAN. Where is that?

Mr. HAWLEY. In the fourth line of that note, on page 8. It says that one clerk, at \$2,000, and one clerk, at \$900, have been added.

The CHAIRMAN. Yes. I was just following the items as they appear in the estimates. This is in the footnote. There is an increase there of one \$900 clerk. I presume you have nothing further to say in regard to that except that it is rendered necessary by the increased work of the Bureau.

Doctor MELVIN. Yes; that is the only reason we have for it.

The CHAIRMAN. Then you dropped two clerks at \$600?

Doctor MELVIN. Yes.

The CHAIRMAN. For the reason that you think that you can not get satisfactory service at that salary?

Doctor MELVIN. No; we can not get competent clerks for that, as those we can get at \$600 are very indifferent and unsatisfactory, and we would rather have a fewer number of a higher class.

The CHAIRMAN. Then, really, you are adding one clerk at \$900 to take the place, in effect, of two clerks at \$600. Is that the proper construction to put on this?

Doctor MELVIN. Yes.

The CHAIRMAN. You cut off one messenger. I presume that is owing to the fact that in the new building you will not need so much service of that kind?

Doctor MELVIN. Yes.

The CHAIRMAN. And you cut off one skilled laborer for the same reason?

Doctor MELVIN. Yes.

The CHAIRMAN. So that there is a net decrease in your salary roll of \$1,070?

Doctor MELVIN. There is one skilled laborer at \$720 and there are two skilled laborers at \$480 and one fireman at \$720 that have been dropped from the estimate.

The CHAIRMAN. All of that is due to the removal to the new building?

Doctor MELVIN. Yes.

The CHAIRMAN. In your lump-sum appropriation the words in italics, beginning almost immediately under the head of general expenses, "and the provisions of the act approved March 3, 1891, providing for the safe transport and humane treatment of export cattle from the United States to foreign countries, and for other purposes;" how does it happen that that language has not been included since the passage of the act of 1891?

Doctor MELVIN. I think it has always been included until this new meat bill passed, but in eliminating the language from the previous appropriation bill which would naturally be carried into the meat bill this was taken out of the general-expense appropriation and was omitted from the meat bill, so that since July, 1906, this provision which the law had always previously carried has not been reenacted.

The CHAIRMAN. Have you been operating just the same as if it were in the law?

Doctor MELVIN. Just the same; yes.

The CHAIRMAN. You are called upon occasionally to enforce this law, and you spend some money in that way, do you?

Doctor MELVIN. Yes. This covers our supervision of export animals and the inspection of the vessels and fittings of the vessels that are to carry these export animals. We have had rules and regulations for some years specifying certain dimensions of fittings that shall be

provided for export cattle, horses, and sheep, and have supervised the transportation of the live stock. I might say for the information of your committee that the insurance, which used to be at about the rate of 10 per cent for these export cattle, has been decreased under the supervision of our Department to considerably less than 1 per cent.

Mr. HAWLEY. Will you please state that again?

Doctor MELVIN. The insurance rate on export cattle, which prior to the time the Department began to supervise the shipment of these cattle was about 10 per cent, since that time has been reduced to less than 1 per cent.

The CHAIRMAN. Which is a striking confirmation, it seems to me, of the wisdom of this legislation of 1891.

Doctor MELVIN. These regulations control the movement of the export live stock. For instance, if they originate at Chicago, and are en route to New York through Buffalo or intermediate points, there is an inspection as to their condition and treatment, requiring them to have the requisite amount of rest before being loaded on shipboard, and that the necessary amount and quality of feed and water shall be provided by the steamship company or the shipper. The attendants are also closely scrutinized, as a certain portion of them are required to be men who have had previous experience with such shipments; they must be experienced cattlemen. Then the fittings that shall be erected must be of certain dimensions, so as to secure the safety of the cattle in times of storm. All of this has resulted in this great reduction in the insurance rate, showing the efficiency, I think very plainly, of the service.

Mr. HAWLEY. Do you have any record of the decrease of the loss of animals in transportation as the result of that inspection?

Doctor MELVIN. Yes; I have that at the Department; not here.

Mr. HAWLEY. Has it resulted in a decrease in the loss of life?

Doctor MELVIN. Yes, the loss is now very low, less than 1 per cent. Very frequently loads of 800 or 900 cattle would go across to London or Liverpool without any loss at all. It is not infrequent, at all, whereas previously I have seen three or four hundred out of that many lost and thrown overboard. That was not uncommon, and it was largely due to defective fittings. They were insecure. The vessels would get into storms, the cattle would break down the fittings, and then they would just roll from one side of the vessel to the other. Frequently in the tramp steamers they would erect temporary fittings on the top deck, and then, if there was a storm, in order to save the vessel they would have to drive the stock overboard. All that has been changed. These fittings are now of a permanent character, and are as secure as any other part of the vessel.

The CHAIRMAN. I believe the committee would like to have you give us some review now, in a general way, of the work you have been doing in the past year under the authorization of the paragraph which we are now considering. Particularly I should like to ask you about the outcome of your work with cattle and sheep diseases in the Northwest. We have been appropriating for some years to carry on work in the eradication of scab and other diseases among the sheep and cattle of Wyoming and the other western ranges, and I would like to know how that work is getting along, whether any of it has been finished.

Doctor MELVIN. We have for a number of years been cooperating with a number of States in the endeavor to eradicate sheep scab, and later we took up the cattle scab. The States in which we have been working on the sheep scab, and which were quarantined on account of sheep scab, were the two Dakotas, Wyoming, Idaho, Washington, Oregon, California, Nevada, Utah, Montana, Colorado, New Mexico, and Arizona; practically all of the States west of the Missouri River. We have released from quarantine the States of Wyoming and Idaho during the past summer.

The CHAIRMAN. Does that mean, Doctor, that you have entirely withdrawn your force of inspectors from those States and have turned them over to the State authorities?

Doctor MELVIN. Yes. The only men that we maintain in those States are at certain shipping points where sheep which are simply passing through the States are unloaded for feed and water in transit.

The CHAIRMAN. Those are the States of Wyoming and Idaho?

Doctor MELVIN. Yes.

The CHAIRMAN. To what extent are you cooperating with State authorities in the other States that you named, and in what way?

Doctor MELVIN. In Colorado, New Mexico, Arizona, Utah, Oregon, and Nevada we have been conducting cooperative work on the sheep scab, the States providing part of the working force and the Department providing the balance of it. In some States the Department provides more than the State does; in others it is nearly equal. It depends upon the ability of the State to cooperate.

Mr. POLLARD. Does the State furnish part of the funds to carry on the work where the cooperation is carried on?

Doctor MELVIN. Yes. In some they furnish a considerable amount in money by the direct appointment of employees, and in other cases they appoint the employees who receive their pay in fees collected from the stock owners. That was the case largely in Wyoming. I think in New Mexico they employ their men by direct pay. The Territorial law provides a per cent tax collected from the owners of sheep for the purposes of employing these people.

The CHAIRMAN. Are there any of the States in which you are doing all the work without any help from the State authorities?

Doctor MELVIN. Not in the way of eradication of scab. Take, for instance, the State of Washington. We have no cooperative work there, but we have to maintain several men in Washington to inspect the shipments that are going out of Washington into other States, to see that they are free of disease. We have not attempted to eradicate the scab in that State. The State is simply in quarantine, and it is necessary for us to see that the interstate shipments are free of disease.

Mr. POLLARD. Do I understand that where you go into a State for the purpose of eradicating the scab and the tick in cattle, there is a fee charged; that the owner of the cattle has to pay in the way of a fee for the eradication of the tick?

Doctor MELVIN. To the State, but not to the Department employees. Some of these States have their laws so arranged that by the order of the board, or by direct order of the law itself, the employees can collect a fee for their services in conducting this inspection and, when necessary, for the dipping of the stock. But that

does not pertain to Department work. Our men are paid per annum salaries and necessary expenses, and that is the only compensation they receive.

Mr. POLLARD. About what per cent of the expense that has been entailed in the prosecution of this work has been borne by the Federal Government?

Doctor MELVIN. I think I have a statement here, perhaps, that will show that. I have not a comparative statement. I can tell you about what the various States have expended during the past year, 1907. Arizona expended \$1,748, New Mexico \$18,457, Wyoming \$12,100, Nevada \$4,264, Utah \$3,058, Oregon \$80,041. That figure for Oregon is, I think, somewhat misleading, as I think they have included in that the cost of dipping, not the cost of inspection services only. That is the statement they gave us, though, as to their expense in conducting this work.

The CHAIRMAN. Have you probably spent more or less than the sums mentioned in each of those States?

Doctor MELVIN. We have undoubtedly spent more.

Mr. POLLARD. Have you a table there showing the amount that the Government has expended in this work?

Doctor MELVIN. We have a statement for the total expenditures, but not for the States, to compare with this.

Mr. POLLARD. Does that list you have in there cover all the States that have contributed in a financial way to this work?

Doctor MELVIN. Yes; on account of sheep scab.

Mr. POLLARD. When your experts go into a State to assist in the eradication of the scab, or where they go in of their own volition without any cooperation on the part of the State, what does the Federal Government do? For instance, you go in and dip a flock of sheep; does the sheep owner have to furnish the dipping tank and the material of which the dip is made, or does the Government furnish that?

Doctor MELVIN. The sheep owner furnishes all the facilities for the dipping.

Mr. POLLARD. You simply furnish a man to put them in?

Doctor MELVIN. To supervise the dipping, to see that the preparation or medicine used in the dipping is properly prepared, of a sufficient strength, and that the animals are kept in this solution for a sufficient length of time; also to inspect the stock, and in the case of diseased animals they are required to have two dippings, and where they are only exposed there is only one dipping; the inspectors determine whether they shall be dipped twice or once.

Mr. POLLARD. The ordinary labor that is necessary, then, for the care of the sheep is borne by the sheep owner?

Doctor MELVIN. Yes, sir.

Mr. POLLARD. And all the Government pays out is simply the expense of the expert in supervising the work?

Doctor MELVIN. Yes, sir; that is all. There is another feature of expense, and that is where our men go out on the ranges to inspect the stock as it is on the open ranges. There we have to provide them with transportation facilities, sometimes one horse and sometimes two horses, one to ride and one to pack his bed and subsistence.

Mr. POLLARD. What do you do when you come to a sheep rancher that objects to your dipping his sheep, even where his flock is infected?

Dr. MELVIN. It is then up to the State authorities to take care of him, and they usually quarantine his animals on restricted premises and keep them there until he will clean his sheep. They give him bounds on the open range, they select a certain site for him, and he is required to keep his sheep on that land until he will clean them. Of course we could and would stop him from making an interstate shipment, but we would not undertake to stop him in any of his movements within the State.

Mr. WEEKS. Are there State laws to compel him to have his sheep treated?

Doctor MELVIN. In some States the officials have authority to dip the sheep, and the sheep may then be sold, if necessary to pay for the expense. They can compel him in an indirect way, by restricting the movement of his sheep until he is obliged to take some action in the matter, and sometimes it is to his advantage to do it that way. Oftentimes the weather is so inclement in the middle of the winter that it would be inhuman and impracticable to dip at that time, and he is restricted until later in the season when he can dip.

The CHAIRMAN. Are there any other States among the list you have named in which you think you will soon finish your work?

Doctor MELVIN. I think that we have a very fair prospect of finishing this coming year in Utah, New Mexico, and Arizona, and possibly in Oregon, but I am not so certain about the latter. The Oregon authorities worked very heartily along this line last summer, and it may be that we can clean up the disease in Oregon next year.

The CHAIRMAN. But in all of these States you are working to the end of eradicating the disease?

Doctor MELVIN. Yes, sir.

The CHAIRMAN. You are not merely maintaining a force there to enforce State laws?

Doctor MELVIN. No, sir. All these sheep, practically speaking, come to the East, even from Oregon. Their market is in the East, and at some time in the life of the sheep it has got to take a trip to the East. A certain percentage of the lambs are shipped every year to the East, to the large markets, such as Omaha, Chicago, Kansas City, etc., and as the old stock become unfit for breeding they are shipped usually to the grain centers, where they are fed for a time and gotten into condition for market, and then they are shipped farther east to these markets and slaughtered. Therefore it is, in fact, work to prevent interstate shipment of diseased animals, even though this dipping is done on the range. It is simply a matter of the place where the dipping is done.

Mr. POLLARD. In this work that you carry on in the States is it, as the chairman suggested, in the carrying out or the enforcement of the State laws, or in the carrying into effect of the Federal laws? In other words, where do you draw the line between the work of the Federal Government and the work of the State and the operation of the State laws?

Doctor MELVIN. The Federal law provides for just this class of work. If you will permit me to read from the act known as "Public—No. 41," approved May 29, 1884, it says:

SEC. 3. That it shall be the duty of the Commissioner of Agriculture to prepare such rules and regulations as he may deem necessary for the speedy and

effectual suppression and extirpation of said diseases, and to certify such rules and regulations to the executive authority of each State and Territory, and to invite said authorities to cooperate in the execution and enforcement of this act.

That is for the eradication of contagious diseases.

Whenever the plans and methods of the Commissioner of Agriculture shall be accepted by any State or Territory in which pleuro-pneumonia or other contagious, infectious, or communicable disease is declared to exist, or such State or Territory shall have adopted plans and methods for the suppression and extirpation of said diseases, and such plans and methods shall be accepted by the Commissioner of Agriculture, and whenever the governor of a State or other properly constituted authorities signify their readiness to cooperate for the extinction of any contagious, infectious, or communicable disease in conformity with the provisions of this act, the Commissioner of Agriculture is hereby authorized to expend so much of the money appropriated by this act as may be necessary in such investigations and in such disinfection and quarantine measures as may be necessary to prevent the spread of the disease from one State or Territory into another.

Mr. POLLARD. Then the work you do is in the carrying out of our Federal laws and not in the execution of the State laws.

Doctor MELVIN. No, sir; but before we would attempt to cooperate in the eradication of a disease within a State we would ascertain that the State had efficient laws of its own to enable this work to be carried out; in other words, that it had the power of quarantine and police powers sufficient to enforce reasonable regulations for the eradication of the disease. Otherwise we could not do anything but simply hold that State in quarantine and permit only such movement out of the State as was justified by the condition of the stock. Take such diseases as the foot-and-mouth disease when it existed in New England. That work was carried on under this law of 1884, and it resulted in a complete quarantine for a considerable length of time of all live stock in several States. Later, when the bounds of disease were more accurately ascertained, stock could be, and was, permitted to be shipped out from other sections of the State. So we have in this work large sections of States that are free of this disease, and the stock from those sections is permitted to be shipped out without inspection; but in sections where it is known to exist the stock is subject to inspection before it goes out, but in the case of disease it is required to be first dipped.

Mr. COOK. In answer to Mr. Pollard's question you stated the expenditures in States of the Rocky Mountain region. I did not understand the expenditures of Colorado as to inspection and dipping. You read off the other States, New Mexico and Arizona, but I do not think I heard the State of Colorado mentioned.

Doctor MELVIN. We have not any estimates for Colorado, of any considerable proportion. Nearly all of our sheep work was carried out by Federal authority and at Federal expense. Most of that was in the southwestern portion of Colorado, and these sheep range largely between New Mexico and Colorado. They can hardly be considered as belonging to either Colorado or New Mexico.

The CHAIRMAN. They are interstate sheep, are they?

Doctor MELVIN. They are interstate sheep, traveling to a certain extent back and forth, according to the season. They go into Colorado in summer, and into New Mexico in winter, and nearly all of that work was done by Federal officers alone. I think there was considerable dipping of cattle in Colorado, but I have not an estimate of that.

The CHAIRMAN. Does what you have said in regard to your work with sheep scab apply in a similar way to the cattle?

Doctor MELVIN. Along the same general line; yes, sir.

Mr. RUCKER. Is there any considerable loss of the sheep as the result of that dipping?

Doctor MELVIN. There is some loss. It depends very largely on the condition of the sheep. When they are very thin and poor there is quite a considerable loss, but when they are in fair strength the loss is quite low.

Mr. RUCKER. Does that dipping process usually result in the cure of a sheep that is affected with scab?

Doctor MELVIN. It does in the majority of cases; I think in all cases where it is carefully and properly done. I think that the education that the stock owners in the West have had in the way of properly dipping their stock has been of tremendous value to the industry. That in itself has been of great value. The dipping had been performed heretofore in a very perfunctory sort of way, and the expense that the owner had gone to in buying his medicine, dipping vats, and for labor, etc., had been largely lost as the result both of indifference and ignorance of proper dipping methods.

The CHAIRMAN. Do you use the same preparation now that you did when you began this work, or has experience brought a change in the prescription?

Doctor MELVIN. We have permitted, in addition to the lime and sulphur and the tobacco and sulphur dips—the two dips formerly used—the coal-tar dips, containing a certain percentage of cresols and coal-tar oils. There has been a large number of those.

Mr. HASKINS. What does the Government have to do with the work of cleaning and disinfecting cars? I see a large number of cars are cleaned and disinfected.

Doctor MELVIN. Those were probably cars that had contained cattle from the Texas-fever region. The cars that have carried Texas cattle are required to be cleaned and disinfected after the cattle have been unloaded. That would be the largest item, although we do also, in the case of any other animals being shipped that are affected with an infectious disease, require the cars to be cleaned.

Mr. HASKINS. Does the Government do that or the owners of the cattle?

Doctor MELVIN. We supervise the cleaning of the cars. The work of cleaning is done by the railroad companies.

Mr. HASKINS. You simply supervise it?

Doctor MELVIN. At stations like Chicago or Omaha they have a station in proximity to the yards where this cleaning is usually done. They clean out the manure and clean the woodwork and then apply a disinfecting solution.

Mr. HASKINS. It is done at the expense of the railroad company?

Doctor MELVIN. Yes, sir.

The CHAIRMAN. If there is nothing more in regard to this matter, we will now take up the question of the work in regard to the fever tick in the South and how it is progressing. For the information of new members of the committee I may state that two years ago an appropriation was first made for the eradication of the Texas fever tick, and that appropriation has been continued. You will find the

item in the latter part of this publication, on page 49. We have continued it separately from the paragraph under the bureau heading, because it was introduced first as an emergency appropriation, and we hope that it will be an emergency appropriation which can be given over after a while. We would like to hear what progress is being made, how much territory is free from the tick, and whether you have worked out anything particularly new in connection with it.

Doctor MELVIN. We estimate that since the work was first commenced there has been freed from the quarantine an area of 56,538 square miles.

The CHAIRMAN. When did the work first commence practically?

Mr. LAMB. In the summer of 1906.

Doctor MELVIN. Yes, sir; about April, 1906. There was a part of that appropriation made immediately available, so that it was commenced before the beginning of the fiscal year.

The CHAIRMAN. And you say there has been completely freed from the tick an area of about 56,000 square miles?

Doctor MELVIN. Fifty-six thousand five hundred and thirty-three square miles.

The CHAIRMAN. Can you name the States in which that territory is situated?

Doctor MELVIN. In Virginia, 5,626; North Carolina, 8,655; Tennessee, 6,022; Kentucky, 841; Arkansas, 2,487; Oklahoma, 2,612; California, 27,630; Texas, 660 square miles.

The CHAIRMAN. Is there any State which has been completely cleared in which you have been doing work at all?

Doctor MELVIN. Not unless we call Kentucky such a State. The infection was in a small portion of two or three counties there for several years. That, we think, is entirely eradicated now, and that is the only State that is entirely free. In Virginia and North Carolina and California we have made very good progress, and in Virginia and California the tick is almost eradicated.

Mr. LAMB. I see you have a few counties left in Virginia.

Doctor MELVIN. Yes, sir.

Mr. HEFLIN. How is it in Alabama?

Doctor MELVIN. We have only started with Alabama. They had no law previous to last year that they could operate under. We commenced south of the center in two counties last year. The work there is largely experimental, as the appropriation was made for that purpose and with a view of creating some interest in the matter among stock owners. In States where the entire State has been below the quarantine line from time immemorial they are not so much interested in this eradication and do not understand the advantages of having their States free as they do in States where part of the State is free and part of it is quarantined. There those who can reach the market at any time in the year with their live stock see the advantages of it. Then, too, they can grade up their stock, import high-grade stock, and increase their profits in that way, where they can not in the quarantined districts.

Mr. LEVER. You do not go into a State at all unless they have some law protecting you or cooperating with you in the enforcement of your regulations?

Doctor MELVIN. No, sir. In the State of Mississippi, at this time, they have not exhibited any interest in the subject whatever. We have not done anything there; we have not attempted to.

Mr. LEVER. What have you found the situation to be in South Carolina? The legislature is in session there now, and I would like to know.

Doctor MELVIN. They are considerably interested in it. Last year they enacted a law, and worked along the lines that have been followed elsewhere. There are three counties, I think, in which we are operating in South Carolina, in the northwest corner of the State.

Mr. LEVER. Does the Department require any appropriation on the part of the State to help in this work?

Doctor MELVIN. We have not made that an absolute requirement, although, as far as we can get it, we expect about half of the work to come from the State.

Mr. HEFLIN. You invite that assistance, do you not?

Doctor MELVIN. Yes, sir; where they have a sufficient law to operate under.

Mr. HEFLIN. Now, in Alabama we have a law, have we not—an act that was passed recently?

Doctor MELVIN. Yes, sir.

Mr. HEFLIN. To cooperate with you?

Doctor MELVIN. Yes, sir.

The CHAIRMAN. What States are you working in now?

Doctor MELVIN. Virginia, the two Carolinas, Georgia, Tennessee, Alabama, Arkansas, Louisiana—two counties in Louisiana only—and Oklahoma, Texas, and California.

The CHAIRMAN. Have you developed any new methods in making this fight, or are you still working along the old lines?

Doctor MELVIN. No; our methods are governed largely by the section we are operating in. For instance, in the eastern part of the tick area, where the herds are small—often not more than two or three or four animals belonging to an individual—the methods are very different from what they are in Oklahoma and Texas or California, where there are immense droves. There we operate almost entirely by the dipping or complete submersion of the cattle in the dip, and field rotation. In the East it is more the individual treatment of each animal by hand, the spraying with oil by means of hand pumps, and the rubbing of the legs and sides of the animals with different kinds of oils; a frequent treatment and supervision. Also we adopt the field rotation method, so as to leave behind the ticks as they drop from the cattle, and eventually the cattle will end in a clean field without any ticks; and then the infected fields are kept free from any cattle until a sufficient time has elapsed for the ticks to die.

The CHAIRMAN. From the experience you have had—you have been at it now nearly two years—how do you feel about this work, Doctor; that it should go on?

Doctor MELVIN. I think it should, undoubtedly. I think the progress that has been made fully justifies the expense that has been incurred. In fact, I am myself astonished that we have made such rapid progress as we have. Of course, we have been working in the most favorable section of the country for tick eradication; but I think that

progress can be made even when we get farther south, where the weather is favorable to the ticks the year around. I think that if the work could be put on a more permanent basis, if it were possible to do so, it would be economy, and better progress could be made.

The CHAIRMAN. How do you mean, be put on a more permanent basis?

Doctor MELVIN. I was discussing with Congressman Lamb a proposition. Possibly it is not feasible; but if a large appropriation, sufficient to carry the work to completion, could be made, and each year money could be allotted by Congress from this appropriation for carrying on this work, it would put it on a more permanent basis, so that more permanent arrangements could be made.

Mr. HEFLIN. You mean money for carrying on the work in each State, or generally?

Doctor MELVIN. No; I mean as a whole.

Mr. LAMB. You mean a lump sum to be designated, and then each year you have the option of drawing it as the needs develop?

Doctor MELVIN. Yes, sir. I think this work will require possibly fifteen years, possibly more than that, before it is entirely finished, and if we could get an appropriation of, say, several million dollars, and then appropriate from that each year a sufficient sum to carry it on from year to year, that would put it on a permanent basis. It is a big undertaking; there is an immense territory that is below this quarantine line that we have not gotten into.

The CHAIRMAN. Do you think you could expend economically and effectually, say \$500,000, this year?

Doctor MELVIN. I would be satisfied with considerably less than that.

Mr. LAMB. You recommend in this report about \$50,000 increase and then say that that \$250,000 could be advantageously and judiciously used.

The CHAIRMAN. This appropriation is the same as it was last year.

Mr. LAMB. Yes; I see it is.

The CHAIRMAN. I asked the question because there are bills before this committee asking an appropriation of \$500,000, and I wanted the Doctor's opinion as to whether he could profitably use that much money.

Doctor MELVIN. We had this year \$150,000, as you know.

The CHAIRMAN. Yes.

Doctor MELVIN. Now, if we could have that doubled for next year I think it would be sufficient. I would rather increase gradually, than go to the maximum and then decrease.

The CHAIRMAN. Do you not think it is pretty wise to go slowly in this business, for the reason that after territory has been cleared and you have abandoned it, you do not know until a considerable time has elapsed whether it is going to remain clear, and you may have to go back there and do your work over again; and would not you much more probably have to go back and do your work over again if you did it hastily, covering a large territory each year?

Doctor MELVIN. I hardly think that would be the case. I do not think that our work if we had more money would be done any more hastily than it has been; but we could cover other territories in different States. You see, taking the number of States we are now

operating in and dividing this appropriation between them, it has not, of course, been done equally in all States. It was according to the amounts that the States could do themselves. But it does not leave a great amount of money for work in any one State. Now, we could do just as well, with the same amount of administration, probably two or three times the amount of work, if we had funds to employ men.

The CHAIRMAN. Are you getting any help from any of the States where you are doing this work?

Doctor MELVIN. Oh, yes; some of them are equaling, and some of them exceeding, the amount of money we are spending.

The CHAIRMAN. If you have a statement showing the amount of money expended by each of the States in which you are doing work, along the lines on which you are working, will you file it with the reporter? You might read it now, for the information of the committee.

Mr. HAWLEY. Is the infected area increasing?

Doctor MELVIN. No, sir; we were doing some of this work even before this special appropriation was made. In North Carolina, for instance, and in several counties in Tennessee, and in Georgia, and also in California we had succeeded in eradicating ticks before this work was commenced on a general scale. So that I think it was less when we commenced than it had been several years previously. In California the Bureau expenditure was \$15,924, the State expenditure \$5,680, and the county expenditures \$9,387. In many of these States the counties supply the funds. The total for the State and counties in this case exceeded the amount expended by the Government. In Texas we have had very little assistance from the State; such a large proportion of the State is below the quarantine line that the State has not interested itself very much.

Mr. LAMB. They do not care much about it, do they?

Doctor MELVIN. No, sir. Not as a whole.

Mr. RUCKER. Texas has not had much service, probably?

Doctor MELVIN. We have expended \$14,460. The State expense has been merely nominal. In Oklahoma we have expended \$28,574, the State \$2,585, and the counties \$300.

The CHAIRMAN. Is that during the entire period of the work, or just during the current year?

Doctor MELVIN. That is for the year 1907.

The CHAIRMAN. I believe the committee would be glad if you would incorporate in your remarks a statement showing the amount of money spent in each State since you have started the work, and the amount contributed by each State.

Doctor MELVIN. For the first year of our work I doubt very much if we could get a report covering the amount expended by the several States. We tried to get that, but it was so incomplete that it did not amount to anything. We can give it to you for last year as follows:

| State. | Amount expended by— | | |
|---------------------|--------------------------|--------|-----------|
| | Federal Gov-
ernment. | State. | Counties. |
| Alabama..... | \$3,595 | \$920 | |
| Arkansas..... | 9,469 | 1,825 | |
| California..... | 15,924 | 5,680 | \$9,587 |
| Georgia..... | 15,491 | 40 | |
| Kentucky..... | 2,780 | | 1,480 |
| Louisiana..... | 3,562 | 2,451 | |
| North Carolina..... | 19,000 | 2,700 | |
| Oklahoma..... | 25,574 | 2,585 | 300 |
| South Carolina..... | 3,905 | 1,500 | |
| Tennessee..... | 43,278 | 75 | 17,405 |
| Texas..... | 14,480 | 25 | |
| Virginia..... | 15,995 | | 5,105 |
| Total..... | 175,632 | 17,817 | 24,627 |

Mr. RUCKER. Are these diseases you are dealing with prevalent in all the States?

Doctor MELVIN. No.

Mr. RUCKER. I mean, in all the other States?

Doctor MELVIN. No.

Mr. RUCKER. Some of the States are free from the Texas fever?

Doctor MELVIN. Yes; all the Northern States are.

Mr. RUCKER. I would class Oregon and Washington as Northwestern States.

Doctor MELVIN. They are free of this Texas fever.

Mr. RUCKER. I was speaking of both cattle and sheep.

Doctor MELVIN. Yes, sir.

Mr. RUCKER. In Oregon they have not that fever?

Doctor MELVIN. No, sir.

Mr. RUCKER. Take the Middle Western States, Illinois, Kansas, and Missouri, are they subject to these diseases among sheep and cattle, or not?

Doctor MELVIN. Not to such an extent that we have had to quarantine the States on account of the diseases. There are isolated cases of scabies among the cattle of Illinois and Iowa, but they are so few that we have relied entirely upon the local authorities to handle them. Most of those cases are of disease reintroduced by stock from the West.

Mr. RUCKER. Upon what do you base the hope that when once eradicated, or once driven from the State, if you please, the disease will not appear again? What is there, in other words, to induce the belief that the same conditions which once produced the Texas fever and in Colorado the sheep scab will not occur again?

Doctor MELVIN. It depends entirely upon the General Government and State authorities to police their State, and in the event of the disease appearing again through its introduction from some other State, to quarantine and eradicate it.

Mr. RUCKER. I do not want to be misunderstood. If the Texas fever, the Texas tick, has its origin there, due to natural conditions, even after you have exterminated it, cured it, and it has left the State, why will not those same natural conditions again produce the fever in the cattle?

Doctor MELVIN. It could not occur in Texas after it was eradicated unless it was reintroduced from some other State.

Mr. RUCKER. It could not occur again?

Doctor MELVIN. No, sir; not unless it was reintroduced there.

Mr. RUCKER. What I was trying to get at was why it could not?

Doctor MELVIN. There would be no ticks there.

Mr. RUCKER. If a man has pneumonia and is saved from dying by the doctors, what prevents him from contracting pneumonia again at some other time?

Doctor MELVIN. The ticks are animal parasites. If the ticks were eradicated there would be no possibility for them to occur again.

Mr. RUCKER. Sometime, somewhere, somehow it produced itself once. They did not always exist there, possibly; I do not know about that. I have heard that Texas had most everything, but I did not suppose it had that always. Now, I am very much in sympathy with the work, I am not criticising it, but I am trying to get information.

Mr. LAMB. Here is the information in this report, from the expert. Here is the history of the devil. He was localized in Morocco, in Africa. The tick migrated to Spain, and then crossed the Atlantic to Mexico, and then he jumped the Rio Grande, and then he spread all over Texas, and went in every direction on the bodies of Texas steers, they prevail more or less in force from San Diego in southern California, to Norfolk, Va. These ticks are local in that respect. Now, when you remove the distributing agency, you get rid of the ticks.

Mr. RUCKER. You get rid of the ticks, and then you have to watch the movements of the cattle, and even the landing from vessels?

Secretary WILSON. That is correct.

Mr. RUCKER. That is what I am trying to get at. I want to know whether the work is going to be effective after the removal of the tick?

Secretary WILSON. We can take care of it after that.

Mr. RUCKER. Is it not true that after the Department of Agriculture finds the way and opens out the way and educates the people in this respect, the people will then have to take it up and make effective that which you are doing now, to a large extent?

Doctor MELVIN. We would hope so, and I think they will do so.

Mr. RUCKER. It seems to me if they will not do so we might as well quit trying. I think they will.

Secretary WILSON. They will.

Mr. LEVER. They are doing so now, are they not?

Mr. RUCKER. I understand that some of the States are assisting in the work, but others are not.

Mr. LEVER. I think all the States have laws enabling them to keep on in this work.

Doctor MELVIN. All except Mississippi.

Mr. RUCKER. If the people are not willing to assist in the work I think the work should be stopped.

Mr. LEVER. They are making appropriations.

Mr. RUCKER. You can not kill the Texas cattle tick by simply putting a statute on the book.

Mr. LEVER. The Doctor says there are laws in every State to cover this purpose.

Mr. LAMB. The whole country is affected by this and is as much interested as the South is.

Mr. RUCKER. I grasp that, that the whole country is affected.

The CHAIRMAN. It seems to me that in view of the great amount of work we are doing the States ought to show appreciation of it by at least doing something themselves, and I very much believe it would be the sentiment of this committee that if a given State does not care enough for this work to pass the necessary legislation to cooperate in the work and to pass the necessary appropriations to bear a reasonable share of the expense your Bureau ought to leave that State alone, and it seems to me that would be the proper thing for you to do.

Mr. RUCKER. A kind of a local-option idea. I think it is a good one, too. If the State does not help, go and help somebody else where they do help.

Mr. LEVER. Let me suggest that the Doctor include in his statement in reference to the expenditures by the States to cooperate in this cattle tick work a statement showing the amounts appropriated by the different States in cooperation with the Department in the work of the eradication of sheep scab, and so on.

The CHAIRMAN. That is a good suggestion. I hope the Doctor will do that.

Doctor MELVIN. I have already given the expenditures by States, so far as I have the figures. I have not exact information as to appropriations by States, and it would take some time to get it. The States do not usually make specific appropriations for this work. Sometimes the expenses are paid out of a general appropriation which is broad enough to cover the case.

Mr. HAWLEY. If you cooperate only with the States that provide appropriations people living across the border several miles on either side would be right together, and one side of the line might be wholly clean, and then the disease might be introduced from the other State just across the border.

The CHAIRMAN. We have that condition now. There is a Texas fever-tick quarantine line.

Mr. HAWLEY. If you had that along the line it would prevent the introduction of the disease.

The CHAIRMAN. That is done now; the infected territory is quarantined absolutely, and that quarantine line is very strictly guarded. It has been ever since the interstate shipment of stock began.

Mr. HAWLEY. Would not the keeping up of that quarantine line exceed the expense, in the long run, of the eradication of the tick?

The CHAIRMAN. We have always maintained the quarantine. That is done with comparative ease.

Doctor MELVIN. It has been done since 1890.

The CHAIRMAN. Have you any figures that show even approximately the financial advantage which has been gained by the eradication of the tick from these 50,000 square miles?

Doctor MELVIN. No, sir; I have not anything now. I doubt whether they have been free a sufficient length of time to have gotten the full advantage as yet.

Mr. LAMB. The papers so represent, and there are statistics in some of these magazines I have read which speak of the great benefits that have accrued. I know there have been benefits accrued to my own State. There are counties where before they could not do anything,

and now they ship their cattle North and get good prices. Before they could not ship any farther than Richmond.

Doctor MELVIN. In these estimates they include the increase in the value of their real estate outside of the quarantined districts, which, of course, is tremendous, but I do not know that I could get what you ask very well.

The CHAIRMAN. Is there any collateral advantage of this work? You understand what I mean; is there any advantage in the way of instructing the people in better methods, either in maintaining the health of their own animals or feeding their animals or pasturing their animals?

Doctor MELVIN. Yes; that all comes under this work. One line of our work is by this field rotation system, the idea being to take infected cattle and put them into a clean field, for instance, a stubble field of some sort, and keep them there for twenty days, and then, before the ticks would have time to drop off and hatch eggs and re-infect them, to move those cattle to another forage field of some sort, and so on to another field, and with three rotations they would be back into the original field, which would have become free of ticks, and the cattle would be free of ticks at the same time. Now, to do that they have to manage their crops in certain ways; they have to raise certain crops, and our men have been instructed along this line of field rotation so that they can advise the farmers what to do, and they have done that to a very great extent. The production of cattle is, without doubt, the salvation of the cotton fields of the South, and if they can grow cattle again successfully on account of the eradication of this tick, the advantage to the South is going to be incalculable.

Secretary WILSON. I might add, Mr. Chairman, if you will permit me, that through other bureaus of the Department we are in touch with 100,000 Southern farmers in the boll-weevil districts, and these citizens are being taught the value of the rotation of crops, and so forth.

Mr. LEVER. I have seen it stated somewhere that the difference in the price per pound of beef cattle below the line of quarantine and above it amounted to about one-quarter of a cent per pound, and that the South thereby suffered a loss annually of something like \$40,000,000. What have you to say as to that statement?

Doctor MELVIN. Those figures, I think, appear in one of the reports of the Bureau on Texas fever, and they are supposed to be quite accurate—based on facts, on market values.

The CHAIRMAN. I had in mind the statement you have just quoted, and what I was trying to draw out was whether the removal of this pest from the territory had gone to confirm that report, by advancing the price of beef cattle produced in those regions.

Doctor MELVIN. Yes, sir.

Mr. LEVER. I notice that the Doctor has estimated for \$150,000 for the coming fiscal year. If I understood you correctly a moment ago, you really want \$300,000 for this work?

Doctor MELVIN. Yes. I think we can use \$300,000 very economically and conservatively, and to the great advantage of the work. The administration of the expenditure of \$300,000 will not cost any more than it will to expend the \$150,000 that we have had.

Mr. LEVER. And it will really be a saving to the Government to make this appropriation of \$300,000?

Doctor MELVIN. I think it will. In all these things the work must be done while the people are enthusiastic about it. If they become lukewarm and indifferent, it is very hard to go ahead, but while their neighbors are at work on it they want to take it up, and we could cover probably more than twice the area that we covered last year.

Mr. HASKINS. Right in this connection I want to call your attention to a statement on page 11 of your report to the Secretary of Agriculture. Speaking of the appropriation made for the present fiscal year, of \$150,000, you state that you believe that \$50,000 additional should be made available for the remainder of the fiscal year 1908, and that \$250,000 could be advantageously and efficaciously expended during the next fiscal year. Now, I want to ask you whether this work, unless this \$150,000 additional appropriation is made for what you call the present emergency, would have to be abandoned during the next five months, or practically so?

Doctor MELVIN. It is now practically in statu quo. During the winter the ticks are less prevalent than they are in the summer, and for that reason we aim to make most of our inspections during the summer. The force that we are now maintaining is sufficient to police the districts where we have been at work, so as to prevent the bringing in of infected cattle and the reinfection of districts that we have cleaned, but unless we could get an emergency appropriation for this year it would remain right in that condition. We would not make any advance, and it would seriously retard the work.

The season's work commences during the last half of one fiscal year and ends during the first half of the next.

Mr. HASKINS. You think this additional appropriation for the present fiscal year ought to be granted?

Doctor MELVIN. Yes, providing we are to get an appropriation for the following year.

Mr. RUCKER. Take one of the States, either Kansas or Missouri, Indiana or Illinois, one of the States you have not been operating in, and suppose some infectious disease—scab, or some other infectious disease—among cattle or sheep should suddenly break out; if your bureau is notified do you send an expert there to look into it and see what can be done to cure that disease?

Doctor MELVIN. Yes.

Mr. RUCKER. The reason I want to know is because such a condition existed in Missouri not many months ago—only two or three months ago. There was quite a valuable herd of cattle which were attacked by disease, and I think they were all finally killed. Some thousands of sheep were killed.

Secretary WILSON. Did they notify the Department?

Mr. RUCKER. I think not, Mr. Secretary.

Doctor MELVIN. We have had several instances where sheep from Missouri and other States, too, have been found affected upon their arrival at Kansas City and other markets, and we would inform the State veterinarian, and he would then take up the matter and examine the sheep remaining on the premises, with the view of eradicating the disease.

Mr. RUCKER. Suppose an individual had a herd or a flock, and disease should develop among them; if your Bureau was notified would you send an expert there to cooperate there with the State authorities to see what could be done to save them?

Doctor MELVIN. Yes.

Mr. HAWLEY. In regard to that \$40,000,000 that Mr. Lever called attention to, does the tick affect the quality of the meat so that there is a discrimination of one-quarter of a cent a pound against animals that are infected with the tick?

Doctor MELVIN. It affects the quality of the animals themselves. In grossly infested portions of the country the ticks often kill the cattle as a blood-sucking parasite. They injure the cattle so that they can not thrive.

Mr. POLLARD. They can not fatten?

Doctor MELVIN. Yes; they can not fatten. They do very well where there are only a few ticks, as they do not interfere with them so much.

Mr. HAWLEY. So that the butcher in cutting up the meat can distinguish that kind of meat on the block?

Doctor MELVIN. No; a man could not tell the difference between the flesh of a southern bullock weighing 600 pounds and a northern bullock weighing 600 pounds of the same grade of cattle.

The CHAIRMAN. Does not the loss occur chiefly through the fact that these cattle come from a region which has been quarantined, and by all the laws in northern markets they can not be shipped out from the stations where they arrive, and must be sold there, and buyers take advantage of that fact and force a lower price?

Doctor MELVIN. That is correct. Take, for instance, the same quality of cattle that would go to the East St. Louis market; if they were from a northern section, they could be shipped out to any place as feeders, to be fattened. But if they came from below the quarantine line they could not be shipped out; they would have to be slaughtered there.

Mr. HAWLEY. So that it is an arbitrary discrimination, and not one based upon the quality of the meat?

Doctor MELVIN. It is a question of the quality of the stock, too. If this stock was always fit for slaughter, there would not be so much loss; but it is not. A large per cent are thin cattle, and as they can not be sold for any purpose except slaughter, buyers take advantage of that fact, as has been explained.

Secretary WILSON. Then there is difficulty in improving the quality of the breed. Take a northern bull, any finely bred bull, and he would die in a few days after becoming infected with the cattle tick.

Mr. LAMB. Yes, it affects them right away. There is a great loss in that respect. These southern cattle are immune from the tick, but as soon as they are placed in proximity to other cattle that are not infected, the nonimmune cattle become infected and they die directly. I have lost a great many cattle through their being infected by ticks brought by cattle that came from the South.

Mr. POLLARD. In sections where the tick has been eradicated, would it be possible to take from the North highly bred Shorthorns or Herefords, or any of those breeds, and grow them successfully in the South, as we do in the North?

Doctor MELVIN. I think so.

Mr. POLLARD. If we got rid of the tick, you think we could do that?

Doctor MELVIN. Yes; other conditions being equal; if they had equal forage and pasturage.

Mr. LEVER. Have we not as good pasturage in the South as anywhere else?

Secretary WILSON. You can have.

Mr. RUCKER. If you fertilize the ground, of course you can.

Mr. POLLARD. Do I understand that you do not fight the tick by dipping the stock as you do for the scab?

Doctor MELVIN. No; they dip for the tick also, very largely. Of course in sections where the farms are small, and there are not many cattle owned by any individual, it is more economical to remove the ticks in other ways; but in a range country like the West, California or Texas or Oklahoma, there the proper way is to dip them.

The CHAIRMAN. Are you expending any of this money in an entomological way?

Doctor MELVIN. Yes; a small amount of it; not a great amount.

The CHAIRMAN. Are you getting any results?

Doctor MELVIN. Some results.

The CHAIRMAN. What are they?

Doctor MELVIN. We have been conducting some experiments to determine whether other animals than cattle will harbor the ticks, and we have found that they will inhabit sheep for a time, but they do not seem to mature upon the sheep. They usually die before they reach the adult stage. However, we have not finished that investigation, and we have been making some other investigations to determine the life history of the tick, but we have learned nothing of very great importance beyond what we had already known.

The CHAIRMAN. Have you discovered any enemy of the tick, any parasitical enemy of the tick, that you can make use of?

Doctor MELVIN. No.

The CHAIRMAN. If no member of the committee has anything further to ask along this line, could you tell us in about five minutes, or perhaps ten minutes, what you are doing in the way of breeding experiments, for which \$50,000 was appropriated last year, and \$50,000 is asked this year? This is on page 9 of the estimates. I would like to know what you think about that, Doctor.

Doctor MELVIN. We are pleased with the results we have been obtaining from our Colorado experiment in horse breeding. We have had a number of colts from our stallion, "Carmon," and he appears strong blooded; his colts have his principal characteristics. I have not seen any of this year's foals, but I understand they are very nice colts.

In Vermont our Morgan breeding experiment has been progressing. We have a stallion and twelve mares there, I think, headed by the stallion "General Gates," a Morgan horse, supposed to be one of the finest horses, if not the finest, in the New England country. A large section of land was given to the Department by a Mr. Battell.

Mr. HASKINS. In addition to the stock there, there are now 12 mares, 2 2-year-old fillies, 3 1-year-old fillies, 6 sucking colts, and 1 stallion colt on the premises at Middlebury.

Doctor MELVIN. Yes.

The CHAIRMAN. What conditions were imposed with this gift of Mr. Battell's?

Doctor MELVIN. No restrictions at all, I believe.

The CHAIRMAN. Was it to revert to the owner or his heirs when the experiment ceased?

Doctor MELVIN. No; I think not. I think it was purchased for a very nominal sum—in reality a gift; but it was, as a matter of fact, purchased, and it is the property of the United States.

The CHAIRMAN. Who received the deed on the part of the United States; the Secretary of Agriculture, I presume?

Secretary WILSON. The deed is made to the United States. The nation owns the land the same as it owns the land around this Capitol.

Mr. HASKINS. In addition to that 400 acres which Mr. Battell presented to the United States Government, he proposes in the near future to convey 700 acres more to the United States.

Mr. RUCKER. What is the general proposition in regard to this breeding experiment? In what respect is it different from any farmer producing or breeding on his farm?

Doctor MELVIN. This experiment now being conducted there is for the purpose of perpetuating and improving the Morgan strain of horses.

Mr. RUCKER. A certain strain of horses?

Doctor MELVIN. Yes. In Colorado the object of the experiment is different. We have there a strain of horses more of the hackney type, but trotters, and our aim is to produce what is known as a heavy harness horse type from the American trotter.

Mr. RUCKER. The real purpose is to perpetuate certain breeds, certain types?

Doctor MELVIN. Yes; and improve them.

Mr. RUCKER. It just occurred to me that the Government was undertaking a difficult task in selecting the best horse, because I know a man in my district who has the best horse in the United States.

Doctor MELVIN. The horse Carmon was bred in Missouri.

Mr. RUCKER. I do not say he is the best, but the owner says he is the best, and he is advertising him as the best.

Mr. HAWLEY. Are similar experiments being carried on on the Continent of Europe, in Belgium, and in England and other countries, along the same lines?

Doctor MELVIN. No; not exactly. I understand that their purpose is to breed horses for the purpose of locating stallions in various sections of those countries for the use of the small farm owners. I think that is their object, mainly. We have not undertaken that, and I do not think we shall undertake it.

Mr. HAWLEY. They also desire to keep the type true?

Doctor MELVIN. Yes.

Mr. RUCKER. As I learn, there are several fillies and one horse which have been produced on the Vermont farm. What are you going to do with them, sell them, or just keep on raising them? I am asking for information, because one of my colleagues is very anxious to have a horse-breeding station established in Missouri, and I want to get this right.

Secretary WILSON. Let me answer that question, will you?

The CHAIRMAN. Certainly.

Secretary WILSON. This committee or Congress will indicate what they want done. As far as we are concerned, we think that the surrounding States will get the benefit of this.

Mr. RUCKER. In what respect will they get the benefit?

Secretary WILSON. Take the experiment in Colorado. If you consider the horse as he is now, there, the horses of all those mountain States we find are the old Spanish stock, with good feet and good legs and great courage, but they are too small. They are not big enough for remounts for the Army. They make good cow ponies, and that is about all. Now, it occurred to us that if we could start somewhere in the mountain States, we might show them first how to raise a colt, how to feed a colt, and how to develop it to get the size. Then the question comes, With what blood will we begin? The hackney was suggested, and the German coach horse was suggested, and all that. We have in the United States a breed of track horses that have good feet and good legs, and great courage. Those horses have been developed for speed. We thought by selecting and getting large specimens and taking them out there, we could produce something that would sell high, a coach horse, and an occasional trotter, always in demand, and we will soon get the results from our experiment out there. I went out there and looked at them last summer, and they had about 40 females and a lot of males. Now, those males will be for disposition to the surrounding States as a surplus; and as we have a surplus of females the experiment stations of the surrounding States should get them. That is our theory. But you gentlemen have the direction of all this business.

The CHAIRMAN. You do not mean to say that additional legislation would be necessary in order to authorize you to sell the surplus from these farms?

Secretary WILSON. No; but if you found that the Department of Agriculture was not going along lines you approved, you could direct them as you saw fit.

Mr. RUCKER. I was asking in good faith for information.

The CHAIRMAN. I thought your question was to get the information as to what would be done?

Mr. RUCKER. That is true.

The CHAIRMAN. As to what would be done with this surplus stock; therefore, I asked the Secretary if he thought additional legislation was necessary.

Mr. RUCKER. It occurred to me that after a time, with careful breeding and handling and caring for them, the Government would have a great big lot of horses there, and the question is, What are you going to do with them?

Secretary WILSON. That time will come within a year or two. The place will be swarming with them. They are breeding rapidly, and they are healthy, and the natural thing to do will be to increase the herd in another State.

The CHAIRMAN. And your idea is to sell the surplus?

Secretary WILSON. Yes, sir.

The CHAIRMAN. Where it will do the most good?

Secretary WILSON. Yes; to select the poorest out and let them go for what they will bring, to anybody.

Doctor MELVIN. According to our contract, our Department has the right to purchase any or all of the progeny of these mares from the Colorado station.

Secretary WILSON. In New England the same thing will be done. When they begin to overflow the Battell farm in Vermont, we will give some to New Hampshire, under certain conditions, and some to the other New England States.

Mr. HASKINS. I am credibly informed that if the Government were ready to sell to-day those five fillies upon the farm in Vermont, they would command a price of \$500 to \$1,000 apiece.

Secretary WILSON. I have no doubt about it.

Mr. RUCKER. How many such places have you?

Secretary WILSON. Colorado and Vermont are the only places where experiments are being made in horse breeding.

Doctor MELVIN. In Iowa we have an experiment in heavy draft horses.

Mr. RUCKER. Would it not be advisable to have similar breeding places for hogs and sheep?

Secretary WILSON. We are beginning in Alabama along the cattle line.

Doctor MELVIN. And in Minnesota.

Mr. RUCKER. In Minnesota, did I understand you to say?

Doctor MELVIN. There is a line of work in Minnesota, a breeding experiment for the dual-purpose cow, that is, to produce a combined beef animal and milch cow.

Mr. HAWLEY. What is it, a Shorthorn?

Doctor MELVIN. Yes. In this case the Government does not own the cattle. Individuals who are interested in this association are the owners of the stock, and the money that the Department is expending is in the way of directing the experiment and supervising the purchases—the selection of the original stock.

The CHAIRMAN. In order that we may have it all go in the record, will you name all the points at which breeding experiments are being conducted under this appropriation?

Mr. RUCKER. And the kind of animals being bred.

The CHAIRMAN. Yes; and the kind of animals being bred.

Doctor MELVIN. We have discussed three of these already.

The CHAIRMAN. Please name them all together, so as to have it all together in the record.

Doctor MELVIN. In Colorado at the experiment station, with horses. At Middlebury, Vt., in cooperation with the experiment station, with horses.

Mr. POLLARD. Would it not be a good idea if the doctor would give the strains of horses they are trying to develop at those stations?

Mr. HAWLEY. Is it not all in this report of yours?

Doctor MELVIN. Yes.

The CHAIRMAN. Just name the places and the animals and we can look it up in the report.

Doctor MELVIN. In Maine we are experimenting with poultry.

The CHAIRMAN. You did not name Iowa, with horses?

Doctor MELVIN. Yes.

The CHAIRMAN. What part of Iowa?

Doctor MELVIN. At Ames, with heavy draft horses. In Minnesota, with dual-purpose cattle. In Alabama, in cattle feeding. In Penn-

sylvania, animal nutrition investigations. In Wyoming, the breeding of sheep suitable for range conditions. Those are all we have at the present time.

Mr. RUCKER. I want to make this suggestion along that line, for information. In this day and age of the world, when we are having all these new laws, such as the pure-food law and the meat-inspection law, is there not some danger that when the Government goes into a certain locality and undertakes to develop a breed of Morgan horses, or goes into another locality and breeds the Jersey cow, or in another the Durham or the Hereford, that it will prejudice and jeopardize the man who is breeding other stock? Does it not give a kind of Government approval, a sort of "pure-food" stamp or indorsement, to the breeds chosen by the Government, and correspondingly depreciate and disparage the value of the other breeds?

The CHAIRMAN. I think that is a pertinent inquiry, and I would like to hear what the Secretary thinks about that.

Secretary WILSON. At the Colorado station we could not very well be said to be running in competition with any breeder out there, because we are breeding for different purposes. The breeder of the track horse breeds for speed, and we are breeding for size and style. We are breeding out there for the whole country. In Iowa they propose to take the Shire horse and the Clydesdale and cross them, and see if they can not get an American draft horse. Up in Maine they are breeding chickens to try to get the 200-egg hen, the hen that will uniformly and regularly, if well fed, produce 200 eggs a year. The poultry interest, you know, is really more valuable than the wheat interest of the United States, and it is running the cotton interest a very close second.

Our breeding in the United States, up to date, has usually been not for the purpose of meeting the requirements of a locality, but for the purpose of perpetuating an English breed or a French breed, and we have thought that each locality in the United States will have to breed what it peculiarly needs. The South needs a peculiar animal, different from what Minnesota needs, and we have thought that it is high time that the Government was doing something along those lines, particularly in regard to the breeding and development.

Now, if you will study the horse industry of the United States, you will find the Southern States mostly have fine horses; they have the running horse down there. Then in the North, and all the rest of the United States, they have the track horse, and they do not care anything about him for any other purpose under the sun but the track. The Department of Agriculture does not of necessity care to develop horses for the track. We would like to develop something for the farm, and there is not much of that kind being done, to develop an American animal. We have the Poland-China hog, and the track horse, and that is about all we have got. We have a breed of horses, but when you come to find out whether they have a horse that suits any one locality of the United States, there has been little done. The breeders of the United States are perpetuating foreign horses, foreign cattle, foreign sheep, instead of suiting breeds of animals to the United States conditions.

The CHAIRMAN. You say you have been conducting feeding experiments in Alabama, and nutrition experiments in Pennsylvania. What is the difference between those two?

Doctor MELVIN. The feeding experiment in Alabama, for instance, is done under conditions which the ordinary feeder would meet. These animals belong to a stock owner there, and they are handled according to the suggestions of the Department and the experiment station of Alabama, and are marketed under conditions as indicated by the experts of those departments.

The CHAIRMAN. All you furnish is the experience and the advice?

Doctor MELVIN. Yes, sir. In Pennsylvania we have what is called a calorimeter, a large affair in which an animal can be placed so that an accurate record can be kept of all that is taken in or given out from the animal—taken in in the way of food and air, and given out in the way of excrement and gas, and so forth. It is a matter that has been running several years, and from which a great deal of scientific knowledge has been obtained.

The CHAIRMAN. Has any practical knowledge been obtained from it?

Doctor MELVIN. Yes, sir; I think so. Of course it is something that has to be carried over a much longer period of time than a feeding experiment would. It is to determine more accurately the value of these different feeds than could be done through an ordinary feeding experiment.

The CHAIRMAN. That is being carried on at the State Agricultural College in Pennsylvania?

Doctor MELVIN. In Pennsylvania; yes, sir.

Mr. HAWLEY. Have you tried the different kinds of food on the same animal at different times, or on the same animals?

Doctor MELVIN. I think they have done both.

Mr. HAWLEY. There might be differences in the feeding qualities of the animals that would make a difference?

Doctor MELVIN. Yes.

The CHAIRMAN. Last year when this bill was before the House I recall that a motion was made to reduce the sum for animal breeding from \$50,000 to \$25,000. That was very earnestly resisted by Mr. Brooks, of Colorado, at that time a member of this committee, who said that \$50,000 was needed for this current year in order to make certain purchases that were necessary, particularly of expensive horses, but that after those purchases were made there would be no further occasion immediately for great expense, and \$25,000 would be enough for the following year. I would like to know whether you think you could carry on the work satisfactorily with \$25,000 this year?

Doctor MELVIN. Well, they had in mind the purchase of another stallion and more mares for the Colorado experiment. I think that was what Mr. Brooks had in mind to a great extent. Those purchases have not been made. I think it would be advisable, though, to continue the present amount of \$50,000.

The CHAIRMAN. You say those purchases were not made?

Doctor MELVIN. No, sir.

The CHAIRMAN. The purpose which Mr. Brooks had in his mind in asking for \$25,000 was not followed out?

Doctor MELVIN. No; not exactly.

The CHAIRMAN. What occasion did you find for the expenditure of this appropriation, then?

Doctor MELVIN. We stocked this Battell farm in Vermont, which had been given to us, and provided a stallion and a number of mares. We had several mares in Vermont, but after we acquired that farm we purchased that stallion and a number of additional mares, and it was also necessary to expend considerable money in the improvement of the premises on the farm. We have also purchased quite a number of sheep for the Wyoming experiment. Those lines of work have largely taken up that increase in the appropriation.

Secretary WILSON. The Colorado people got increases for other purposes, absolutely necessary to take care of what they had. Their herd is developing very rapidly, and is developing beyond their ability to take care of it in all regards.

The CHAIRMAN. Is it not your opinion, Mr. Secretary, that when a herd develops the surplus should be disposed of?

Secretary WILSON. Yes; but it has not quite reached that point.

Doctor MELVIN. We are hardly justified yet in making the selections.

Secretary WILSON. The horses are too young.

The CHAIRMAN. You do not want to buy another stallion? You have only had the present one for two years.

Secretary WILSON. I think so. Mr. Brooks and I did not agree on all these matters. We have been helping his station, only in different directions.

The CHAIRMAN. I am speaking now in a purely personal way, and it would seem to me very unwise to treat this appropriation in such a way as would within a few years leave the Government with expensive breeding farms on its hands in fifteen or twenty States. It can easily be seen that this could go to an almost unlimited degree, and inasmuch as the principal purpose to be gained by it can only be determined after a long series of years, it certainly seems to me that there should be exercised the utmost caution in the expenditure of the money.

Doctor MELVIN. I think the amount of \$50,000 is an extremely modest one, considering the size and importance of the live stock interests of the country and as compared with what many European countries expend.

The CHAIRMAN. If no one else were doing the work, that is true; but the live-stock men all over the country are doing a lot of this work.

Mr. LAMB. I note in your report to the Secretary of Agriculture, on page 12, that you recommend to us the purchase of another experimental farm, and you wind up by saying:

It is hoped that Congress may be willing to provide for the purchase of a separate farm for investigations in breeding and feeding live stock and in dairying.

I would like you to just briefly tell us why you want this.

Secretary WILSON. That is not in the estimates.

Mr. LAMB. It is a recommendation to you.

Secretary WILSON. Yes.

At 12 o'clock m. the committee adjourned until to-morrow, Thursday, January 16, 1908.

COMMITTEE ON AGRICULTURE,
HOUSE OF REPRESENTATIVES,
Thursday, January 16, 1908.

The committee met at 10 o'clock a. m., Hon. Charles F. Scott, chairman, in the chair.

STATEMENT OF DR. ALONZO D. MELVIN, CHIEF OF THE BUREAU OF ANIMAL INDUSTRY, DEPARTMENT OF AGRICULTURE—Continued.

The CHAIRMAN. When the committee adjourned yesterday morning, Doctor Melvin, I believe you were discussing the breeding experiments, were you not?

Doctor MELVIN. Yes, sir.

The CHAIRMAN. Have you anything further to add to what you said yesterday, or has any member of the committee any additional questions to ask Doctor Melvin?

Mr. COLE. Mr. Chairman, I was not here yesterday and I would like to ask one question. How is the meat inspection coming on; is it satisfactory?

Doctor MELVIN. Very satisfactory.

Mr. COLE. Are you asking for any amendments of the law?

Doctor MELVIN. No, sir; we have not asked for any this year. We considered it advisable to work under the present law for two or more years and ascertain very definitely whether any essential changes were necessary before suggesting any. There have been several of minor importance that have occurred to me, and probably next year we may come in with a recommendation for these minor changes.

Mr. HAWLEY. Is that italic matter on the bottom of page 9 of the estimates new matter?

Doctor MELVIN. That is new matter; yes, sir; and I think we might as well pass to the consideration of that proviso now, if there is nothing further to be said in regard to the breeding experiments.

Mr. LEVER. Before we leave this subject I would like to ask Doctor Melvin if the Department has ever undertaken any breeding experiments in the South, with the view of developing a draft horse there.

Doctor MELVIN. No, sir; there have been no steps taken in that direction.

Mr. LEVER. You will understand that we in the South are plowing three men with one mule. We want to reverse that situation and let one little man plow three big draft horses.

Mr. LAMB. Three men? What are you talking about?

Mr. LEVER. That is right; we have a little mule down there that is absolutely unsuited and unfitted to the big machinery which we will have to use there if we want to develop.

The CHAIRMAN. Do not the big planters in the South put big mules on their plantations?

Mr. LEVER. You can not really get a big mule down there. We can not get a mule that weighs over 900 or 1,000 pounds down there.

Mr. LAMB. You can send to Kentucky and get all you want.

Mr. LEVER. My idea was to develop draft horses.

Mr. HAWLEY. How are your experiments with the dual-purpose cow getting on?

Doctor MELVIN. That has really only commenced. This year is the first year that they have secured any animals.

Mr. HAWLEY. We are very much interested in that proposition in the West.

Doctor MELVIN. It has not advanced sufficiently far for any results to have been obtained.

Mr. HAWLEY. We are very glad you have undertaken it; very glad.

Mr. LAMB. Before you leave this question of breeding, my friend from Missouri was very much interested yesterday in the breeding of horses, and here is a situation I would like the Doctor to tell us about, the experiment in zebra breeding at the experimental farm, and the life and habits of the zebra.

Mr. RUCKER. I have been very much interested in that, Mr. Chairman, but I would say that that matter has ceased to be of any interest to me whatever.

Doctor MELVIN. To state the matter briefly, we have been undertaking breeding experiments at our experiment station at Bethesda, Md., by crossing a Grévy zebra with a mare, a jenny, and what is ordinarily known as a burro, small animals that we had there several years ago for another purpose. This zebra was presented to the President by the ruler of Abyssinia. We have succeeded in breeding this animal and the jenny and several of the burros, but have failed to cross him with a mare except through artificial impregnation. This work was undertaken during the past summer, and we have not yet had any results as to the offspring.

Mr. HAWLEY. Will the offspring breed and reproduce?

Doctor MELVIN. I am not positive about that. It is possible that the crosses between the zebra and the asses may have power of reproduction, but we do not expect to have any such power by the cross between the zebra and the mares. The Grévy zebra, as you probably know, is the largest zebra and is a very beautiful animal. The experiment was undertaken with the hope of producing a very much better animal, a finer looking animal, than the mule, one that would be adapted to the work in the South in Mr. Lever's cotton fields. We have at present another male zebra at the station. We purchased through the consul-general, Mr. Skinner, of France, two zebras, a male and a female. The female unfortunately was injured in transit and died after it arrived at the station, but the male is there and we hope to obtain two females and perpetuate the species here, without having to go to such a tremendous expense every time we procure an animal.

The CHAIRMAN. You are asking here for authority "to investigate, in cooperation with municipal and State authorities, or in such other ways as he may deem best, and to report to Congress upon the prevalence and extent of tuberculosis among dairy cattle in the United States and the relation of this disease and other diseases and insanitary conditions to the production and handling of dairy products which enter interstate or foreign commerce." I would suggest that in discussing this request perhaps the best way would be to tell us what you are now doing along these lines, and what you seek authority to do.

Doctor MELVIN. The work that we have been doing for several years past, and particularly that within the past year, has resulted in our asking for this additional appropriation. In our work with

tuberculosis we found it to be a much more communicable disease than it has appeared to be heretofore. In feeding the feces of tuberculous cattle to hogs the disease was very easily reproduced in the hogs, which accounts for the high percentage, or at least in part for the high percentage, of tuberculosis in hogs, as we find it—the practice of running hogs after cattle at feeding time.

Mr. HAWLEY. In your report you reported 430,000 hogs killed in 1907, as affected with tuberculosis. How long have you been making these investigations as to hogs? That is nearly 10,000 for every State in the Union.

Doctor MELVIN. Those were found through inspection under our meat-inspection service.

Mr. HAWLEY. How long have you been making those investigations—within this last year?

Doctor MELVIN. No, sir; those have been going on for a number of years, but our system of meat inspection has never been as extensive as it is now. It increased under the meat-inspection law from about 170 establishments to something like 700 establishments, so that the number of hogs that have been inspected has increased tremendously during the last year and a half.

Mr. HAWLEY. That is a very alarming statement.

Doctor MELVIN. It is; yes, sir. We have made investigations with reference to the product resulting from the separation of the cream and the milk at dairies, and they have shown that about 20 per cent of what is called the slime or residue resulting from this separation is infected with tuberculosis and will produce the disease when fed to small animals. So that it shows that dairies themselves are a very potent factor in the spread of this disease; that is, dairies where milk is obtained from a number of different farms. If each farmer would separate his own milk, then, of course, he would feed back to his swine only the milk from his own animals, but where it is taken from a number of farms it is, of course, taken to quite a number of other farms. We have also found that cattle will often secrete tubercle bacilli in their feces when we can not discover they have any tuberculosis except through the tuberculin test. We have quite a number of animals that showed tuberculosis only through this test, and a large number of these cattle were secreting tubercles in large quantities. As you know, there is a great danger of the milk becoming contaminated with the feces of cattle, through the dropping of the hair or through the switching of the tail, and it becomes dangerous, not only to animals, but to people who consume the milk. We have demonstrated that these bacilli may be secreted through animals that do not show any affection of the udder, and that these bacilli will exist in butter made under ordinary condition for the length of one hundred and fifty days and be pathogenic, so that the butter has been found very definitely to be almost as harmful as, if not more so than, the milk, as this bacillus is ordinarily suspended in the fats rather than in the skim milk.

Mr. POLLARD. Is the fact that the germs are easily transmitted to a guinea pig reasonable proof that they will also be communicated to the human family?

Doctor MELVIN. Yes; to a great extent. Of course the guinea pig is a very susceptible animal to tuberculosis, and in our investigations with hogs—and I presume their digestive construction is probably as

similar to that of man as almost any of those animals—we find they are also easily affected with the disease when exposed to it.

Mr. POLLARD. Have you in your research any record of any case where tuberculosis in an individual has been traced to milk, or the eating of butter, or anything of that kind?

Doctor MELVIN. As accurately as it could be without making an actual demonstration. Of course that is an impossibility. It has been suggested quite recently that criminals be provided for these purposes of research, and, in my opinion, in some cases it would be quite a good thing. Take, for instance, the study of tuberculosis. A criminal who was about to be hung would undoubtedly be willing to subject himself to demonstrations which would last for a year or two, so as to prolong his existence on earth for that length of time.

Mr. COOK. Doctor, what effect does the curing of hams and bacon and pickled pork by the packers have on the germ? Does that have a tendency to destroy the germs?

Doctor MELVIN. It undoubtedly would. We have not, however, made any definite experiments in that line. Any treatment of that nature would have a tendency to destroy the germs.

Mr. COOK. I am a great ham and bacon eater, and I was simply asking for information on that line.

The CHAIRMAN. What temperature is destructive to the germs?

Doctor MELVIN. One hundred and seventy degrees Fahrenheit will destroy the germs.

Mr. COOK. So that cooking will destroy the germs.

Doctor MELVIN. Yes; if the meat be well cooked and well done the germs will undoubtedly be destroyed. Of course there might be some toxins that would remain, but that would not cause disease, but simply cause some disturbance of the intestinal tract. In some cooperative work that we were doing with the health department of the District we had occasion to test quite a large number of cattle in the District and in the adjoining States of Maryland and Virginia. These have been progressing steadily, and the last time I inquired into this work we had then tested something like 1,200 cattle and had shown that tuberculosis existed in about 18 per cent of these cattle. These, of course, were all dairy cattle, including the bulls that were in the herds. It shows the very alarming extent of the disease.

The CHAIRMAN. Your belief is that the disease will be communicated through milk and its products to human beings?

Doctor MELVIN. Yes, sir; I have no doubt but what it can be. It is the general opinion of most medical authorities nowadays that bovine tuberculosis is transmissible to human beings, and as dairy products are usually consumed in the raw state they are considered a more dangerous source of infection than meat. Congress has seen fit to provide for a thorough system of meat inspection as far as it had authority to go, and it has seemed to me that if that was necessary it was much more necessary that these dairy products should be investigated with the view of determining the practicability of inspection for dairy products as well.

The CHAIRMAN. In your report you state that you have experts in all the great commercial centers who spend about three weeks of every month inspecting the butter that goes into those markets, and other dairy products, and the other week in going about to the prin-

cipal dairies that are supplying the markets. If that work is continued would not it practically accomplish the result that you are asking for through this paragraph?

Doctor MELVIN. No; I hardly think so, Mr. Chairman.

The CHAIRMAN. I mean as far as the dairy products are concerned, now, not as relating to the animals themselves.

Doctor MELVIN. Yes; it would so far as the manufacture and handling of the dairy products are concerned.

The CHAIRMAN. What I desire especially to bring out is your opinion of this question as to whether or not the system we now have does not amount practically to a Federal dairy inspection. Are you not doing about everything along that line that we ought to undertake to do?

Doctor MELVIN. This inspection that these men make only goes back as far as the dairy factory, the butter factory, or the cheese factory, and not to the farm, where the danger of contamination exists. We desire to go back beyond that and inspect the cattle themselves and the stables and surroundings.

The CHAIRMAN. Would not that mean the employment of a vast multitude of inspectors?

Doctor MELVIN. It would require quite a force, yes, sir; but comparing the dangers from consuming raw dairy products with those from consuming meat products, which are ordinarily either cured or cooked, it seemed to me that we were overlooking the greatest danger and making a great deal out of the lesser ones.

The CHAIRMAN. Are not the States paying closer attention to dairy products than they are to meat products?

Doctor MELVIN. Not many of them. Some of the municipalities have taken quite vigorous action in this matter, but not many States.

The CHAIRMAN. Do you not think that when you have made a few more reports based upon additional investigations, showing the extreme prevalence of these disease germs in dairy products, and calling the attention of the people to the necessity of guarding against them, the warning conveyed in those reports will be sufficient to drive municipalities and States to protect the lives of their citizens, without asking the Federal Government, which, it seems to me, would burden the Department enormously?

Doctor MELVIN. Of course I am unable to state whether it would have that effect or not. It is to be hoped that it would have.

Mr. HAWLEY. Could you get the information necessary to convey to the people the sense of the danger that exists, as our chairman suggests, without the authority that you seek in this proviso? I think probably there is sufficient authority if we could have sufficient funds to make this investigation.

Doctor MELVIN. Our present expenditures are up to the amount of the appropriation, and to make a definite investigation of this sort we would require some additional funds.

The CHAIRMAN. Have you made any estimate at all of the amount that you would require to put into effect the items of this proviso?

Doctor MELVIN. No, sir; I have not. We would expect to seek that information if we made such an investigation as is contemplated.

Mr. POLLARD. I do not remember whether it has been in your report or in some annual report, or possibly in some bulletin I have

read, but at any rate I have read some place that the experiments that have been made along the lines of sterilizing the cream before churning have demonstrated that where that is done this tubercular germ is not only destroyed, but that the butter is just as good, and the butter can be made just as well as where the cream is churned without the sterilization. Is that true?

Doctor MELVIN. The dairy division of the Bureau has been making some experiments along that line, not so much with the view of the destruction of the tubercle bacilli, but with the view to the keeping of butter made under those conditions. Of course this cream is merely pasteurized, not brought to sterilization.

The CHAIRMAN. Is that sufficient to kill the germ?

Doctor MELVIN. Yes, sir; pasteurization is sufficient to kill the tubercle bacilli. I do not think that experiment is concluded yet. The experiments have indicated that butter made under these conditions will keep better than butter made under ordinary conditions.

The CHAIRMAN. The flavor or the aroma of the butter is not interfered with?

Doctor MELVIN. No, sir.

The CHAIRMAN. That being the case, if these experiments were carried on further, and it were demonstrated that that system was a success, and it would not only solve the questions of the keeping quality of the butter as well as the extermination of these tubercle germs, why would it not be a good idea, if we reached that point, for Congress then to pass a law preventing the entrance into interstate commerce of butter that was so infected, just as we prevent the entering of meat into interstate commerce that has not been inspected and does not bear the Government stamp? In that way we would reach the same result by forcing the States to take up this question and relieve the Government of this tremendous burden which would necessarily be entailed if we undertook to carry it out all over the country.

Doctor MELVIN. There is no doubt that something of that sort could be proposed. Either the milk could be pasteurized or perhaps it could be certified by the State authorities that the animal was free of disease. You could give them the option of the two.

The CHAIRMAN. It seems to me if that system is a success—if we provided an inspection of butter just as we have of the packing plants—of the butter that is intended for interstate commerce—that would serve the Government infinitely better than if we had to go out and inspect the butter all over the country.

Doctor MELVIN. Yes; and would accomplish the same result. Some of the States have enforced pasteurization of these dairy products that are returned to the farms for feeding animals. Iowa, I think, passed a law that required the pasteurization of all skim milk that was taken back to the farm; but that which went on for people to eat was not pasteurized.

The CHAIRMAN. Do you know how much the States are doing along this line now?

Doctor MELVIN. They are doing a great deal more than was ever done before. Pennsylvania and Massachusetts have been working along the line of eliminating tuberculosis from cattle for a number of years. Wisconsin and Minnesota are working quite vigorously along

this line, and some of the other States are doing more or less. New York State is doing considerable. But in none of the States has it yet been eradicated.

Mr. LEVER. Is this disease more prevalent in the northern section of the country than in any other, or is it spread all over the country generally?

Doctor MELVIN. We have not had quite full enough information yet to say, but so far as we can judge it exists among dairy cattle in all sections.

Mr. COCKS. How do you propose to carry this out? It says in co-operation with State and municipal authorities. Just give the committee an idea of the working of this.

Doctor MELVIN. For instance, we would take up an investigation in the vicinity of a town like Cincinnati, a large city which is close to a State line. There the Federal Government would have more supervision than if it went into an interior town. To inspect the animals of Kentucky, for instance, we would probably require co-operation and assistance from the authorities of Kentucky by their giving to our men authority to inspect within that State, and also similar authority from the authorities of Ohio.

Mr. COCKS. Would it be your idea to have a Government inspector accompany the municipal and State inspector?

Doctor MELVIN. Not necessarily. One man might accomplish the same purpose by having authority from the State or the city.

Mr. COCKS. It occurred to me that the object might be gained by some general plan. For instance, in New York we have the municipal inspectors that have had more or less authority under the State. Just now in New York we have three separate commissions for investigating this same trouble. But it has occurred to me that there might be great duplication of the inspection. We have a great many inspections there now, and my question was how you proposed to work this in connection with these people. Take it in New York; would you cooperate with the city and State people in examining the herds? Would you take their inspection or would you send your men to verify the work?

Doctor MELVIN. We would expect our own men to get out and make the examinations of these cattle. Of course we would prefer to take sections of the country where other officials have not been operating, so that we could get nearer to the true conditions that obtain generally in most parts of the country. Where States and cities have been working in an attempt to eradicate the disease, it would not give the true condition of a large part of the territory of the country.

Mr. LAMB. We have these same officers in Richmond, and in Virginia. We have an educational propaganda going on down there now.

Mr. COCKS. The result of this thing in the State of New York now—the agitation for better sanitary conditions, better milk, so-called certified milk—is that the people are not yet willing to pay the advanced price. Consequently a good many men are going out of the business. Probably they ought to go out of business; but if you could avoid duplication, and work on some general plan, I think it would be a matter of great advantage to the States. We are taking the matter up in the State. We have had several commis-

sions from time to time on this subject, and I thought if you had some well-developed plan I would try to get New York to work in harmony with the other States, so that you would not, as I say, duplicate the work.

Doctor MELVIN. We would expect to compile, as far as we could, information regarding the work of these various municipalities and States; but, as I said before, I do not think it would be advisable for us to expend any considerable amount of money in working in sections that were already being handled by local authorities.

Mr. COCKS. Does that not put a premium on not doing anything by the municipality and the State? They say, "We do not need to spend this money; the United States will come in and do it." That is, it appears to be the tendency of the times for the Federal Government to go to work where the State or the municipality neglects to do anything. I would like to see this matter followed up along the line that Congressman Pollard has suggested, i. e., that we should put something in the law to force this thing by inspection, rather than have the Federal Government do this work in localities that refuse to do it for themselves. That is my thought, and I should be glad to see it taken up along that line.

Doctor MELVIN. I think if it were seen fit later to pass a law requiring products to be inspected before they were shipped into interstate commerce, it would be well to work along that line, but this particular section we now have before us is simply for the purpose of seeking information. We could not go very far with \$25,000 in policing the country.

The CHAIRMAN. Would not your task be very much simplified and the results be about as beneficial if you cut this paragraph in two and let it stop after the word "States," so as to provide only "that the Secretary of Agriculture is authorized to investigate, in cooperation with municipal and State authorities, or in such other ways as he may deem best, and to report to Congress upon the prevalence and extent of tuberculosis among dairy cattle in the United States." Now, it certainly does not need any Federal inspection or report to teach people that milk which is handled in a filthy way is unfit for food. Yet, if you get to investigating that part of the subject, it means that you must send your inspectors to 100,000 individual dairies to watch them work and milk their cows and take care of their milk, and it seems to me it adds enormously to the expense and complexity of your task. The important thing, it seems to me—and I realize the importance of that—is to get figures which will startle the country (as I believe the facts will startle the country), showing the very great prevalence of tuberculosis among dairy cattle. That you could do if the paragraph ended where I have indicated.

Mr. LAMB. You propose to make it educational?

The CHAIRMAN. I would have it educational. In a word, I do not want to authorize here an inspection that will go on and on and on forever. I would like to have an investigation made that will put it up to the people of the municipalities and States to protect the health of their own citizens, and it seems to me that this could be done in a single season.

Mr. LAMB. Mr. Chairman, if we keep on with this thing the people of the States will expect the United States Government to come down

and clean their stables out. It is absolutely ridiculous, in my estimation.

The CHAIRMAN. I would like to have the Doctor's opinion on that proposition, whether it would not simplify his work and bring in practically as good results. If it is not going to bring the results you are seeking, let us know in what way.

Doctor MELVIN. So far as tuberculosis is concerned, and other diseases of cattle, it would answer the need entirely. Of course, a great deal of other information regarding the proper handling of dairy products could be collected by these same men without additional expense.

The CHAIRMAN. Yes; and we have been considering the proper handling of dairy products nearly ever since this Department was organized, and there have been almost tons of literature on this subject printed by the Department, have there not?

Doctor MELVIN. Yes; there has been a great deal.

The CHAIRMAN. And you have men under special appropriation in the South going to individual farms and teaching individual farmers how to handle their cream. I do not see how you could expect to get from this any information beyond that which the Department already has. Do you think you could? I mean new information.

Doctor MELVIN. No; I do not think it would be new information. It would be merely in addition to what we have.

The CHAIRMAN. What is the use of piling up old information that we already have. We had better reprint the bulletins we already have, had we not?

Doctor MELVIN. The only object of placing that language in there was this. It was supposed that these same men who made the examination of the cattle could incidentally collect this other information, and the two things could go together, hand in hand. Of course if it is desired to eliminate that latter section, that could be readily done and we could confine our efforts entirely to the first portion.

The CHAIRMAN. Just in this connection, I desire to say that I read with a great deal of satisfaction, and I have no doubt that all the other members of the committee who read the report felt the same satisfaction, the remarks you make in connection with some line of work you have been doing in connection with stock, that it was regarded as educational and that after another season or two it would be dropped.

I think the sentiment of this committee is that to a very great extent you ought to regard all the work of your Bureau as educational, except that which in its very nature must continue from year to year, and that you ought to try to convey the sentiment—try to convey the information to the people in the States and municipalities where you operate—that you are there simply to teach them how to do it and not to bear the expense and burden of doing it; because, as has been suggested here, it is a very natural thing for States or municipalities to step out from under a burden where they find somebody else willing to assume it, and the tendency is so strong all the time to shift these things onto the Federal Government that, if we encourage it in the least, we get into lots of trouble. I merely make these suggestions to give you what I feel sure is the sentiment of the committee.

Mr. POLLARD. I understood you to say that you were already carrying on investigations in New York City in milk and butter and other milk products. Is that true?

Doctor MELVIN. No; we have one inspector located in New York City and one in Chicago, who inspect the butter as it comes into the markets in those cities, and this with a view of determining that which is not up to the standard, and for the purpose of informing the manufacturer as to the defects in this butter so that he can remove them. But that only deals with the commercial end of the affair and not with the wholesomeness of the product.

Mr. POLLARD. Under what law is that?

Doctor MELVIN. That is under a general law, I think, providing for the dairy work of the Bureau.

Mr. POLLARD. That is not under the pure-food law?

Doctor MELVIN. No, sir; it is not done as a food measure at all. It is entirely a commercial measure for the purpose of teaching the butter makers how to produce a better product and to overcome the difficulties that they have in making a first-class product.

Mr. BEALL. Is not a large part of that butter produced in Illinois, that is inspected, which goes to Chicago?

Doctor MELVIN. I do not know what the general source of production is.

Secretary WILSON. There is another bureau of the Government you will hear from presently, if you call on the chemists, which has jurisdiction under the pure-food law under the head of cleanliness and healthfulness of food products, and misbranding, and all that sort of thing.

Mr. BEALL. Do you inspect this butter you speak of, regardless of its point of origin, whether or not it was made in Illinois or whether or not it was to be nearly all consumed in Illinois?

Doctor MELVIN. No; it is inspected in the wholesale markets irrespective of where it comes from, and of course its final destination is not known at that time. The idea is to improve the methods of manufacture.

Mr. BEALL. Where do you get authority for inspecting such products unless they are connected with interstate commerce?

Doctor MELVIN. The same as we would have in studying any of these problems in the manufacture of dairy products.

Mr. BEALL. The work, then, that you have done has been simply for educational purposes, for the purpose of your own information, in order that you may enlighten the public generally, and not for the purpose of affording an inspection of this particular product, looking to the consumption of it?

Doctor MELVIN. No, sir.

Mr. BEALL. Another thing. You spoke of examining about 2,000 cattle in the vicinity of Washington City, and of having found about 18 per cent of them infected with tuberculosis. Aside from the information that you gathered on that subject; what has been the practical result? Are those 18 per cent of cattle that you found infected, still supplying the people of this vicinity with milk and dairy products?

Doctor MELVIN. I do not presume that many of them are. A great

many of the dairymen, however, at once proceeded to dispose of their diseased cattle by slaughter, and replaced them with healthy cattle, after disinfecting their premises. The city has done a great deal in the matter. I do not know how far they have gone toward disposing of all of these cattle. The District authorities now have a bill under consideration for presenting to Congress, giving them further authority in the matter.

The CHAIRMAN. I notice in your report, on page 57, referring to the work in southern dairying, for which an appropriation of \$20,000 was made, you speak of the erection of barns and silos. Was that work done at the expense of the Bureau or only under its direction?

Doctor MELVIN. None of the stables or barns were erected (except by advice) through the Bureau. In one instance, I think two years ago, a silo was erected in South Carolina at the expense of the builder with a guaranty from the Department. That contract has expired. This past year one was erected in North Carolina under the same conditions. Those are the only building operations that we have had.

The CHAIRMAN. Then these referred to in these paragraphs were built at the expense of private owners?

Doctor MELVIN. Yes, sir.

Mr. McLAUGHLIN. What kind of a guaranty does the Government give to the individual?

Doctor MELVIN. In the event of the spoiling of the contents, reimbursement was to be made. That is for the first season.

Secretary WILSON. That is the same policy that is adopted in our demonstration work all over the country. We have to coax people to let us show them how to manage a farm for the first year, and in some cases, as in the cotton boll weevil work, they were guaranteed an average crop in order to have them adopt our methods of carrying on a farm. The Government has never paid much of that kind of money, however. There is very little of it being done.

Doctor MELVIN. These buildings mentioned here were merely constructed under the supervision of, but not by, the Department.

The CHAIRMAN. Have you any figures which will show us how many people have probably been reached through your southern dairying operations? You speak here of going to individual farmers and taking one man at a time.

Secretary WILSON. I am having a report made for you from all the bureaus doing demonstration work, and that will be given to you in a day or two.

Doctor MELVIN. We have not compiled such a report.

Mr. LEVER. How long will your work in the South have to continue before you will think you have completed it and gotten the necessary information to those people?

Doctor MELVIN. I presume in some sections it is rather indefinite. In one or two of the States—two, I think—the States have already undertaken to supply men in the place of the instructors we have had, and of course our men will be withdrawn to other fields or else assigned to other work.

Mr. LEVER. So that you are making considerable progress?

Doctor MELVIN. I think we have made considerable progress.

The CHAIRMAN. What I wanted to know was whether the information and instruction and "wet nursing" you give to one farmer

helps anybody besides that farmer, or whether you will have to take one man at a time all the way along the line.

Doctor MELVIN. The idea is that if any one farmer receives any material benefit from this instruction the other farmers will proceed along the lines that he is following. Of course it remains to be seen whether the benefits are sufficient to induce others to take up the same line of work. Our results have indicated so far that they are, and in these particular States the State people have been so impressed with the necessity of this work they are undertaking to do it for themselves.

The CHAIRMAN. Are there any States where you have been working where you have now withdrawn?

Doctor MELVIN. Not entirely. We expect to withdraw from North Carolina this year, and Louisiana is also taking it up.

Mr. GILHAMS. I would like to ask the Doctor if it is possible for a Government inspector who is placed at one of the packing institutions by the United States to tell whether a beef is tubercular before he is killed.

Doctor MELVIN. Only through the tuberculin test, which, of course, it is impracticable to use. They can determine it in some instances, where it is well developed, but not usually.

Mr. RUCKER. That is, you can not tell it after the animal has been slaughtered.

Doctor MELVIN. We can not tell it before the animal has been slaughtered. We can tell after it has been slaughtered.

Mr. RUCKER. You can not tell before.

Doctor MELVIN. Not before the animal is slaughtered; not in all instances. In comparatively few instances could we tell that an animal was affected with tuberculosis before it was slaughtered, except through the tuberculin test.

Mr. BEALL. With that test can you always determine the matter?

Doctor MELVIN. In about 98 per cent of the cases.

Mr. RUCKER. What is that test, Doctor, if you can state it briefly?

Doctor MELVIN. Tuberculin is a product that is produced by growing tubercle bacilli on a medium, and then after this growth is sufficient on top of this bouillon, or whatever is used as a medium, the product is shaken up together, bacilli and all, and it is then sterilized and filtered, and the clear product is injected into the animal. If the animal is infected with tuberculosis it should produce a sufficient rise in temperature to indicate that it is diseased; about $2\frac{1}{2}^{\circ}$ for a given period would indicate that it was affected with tuberculosis.

Mr. HAWLEY. What other effect has it on the animal?

Doctor MELVIN. None whatever, if the animal is not affected with the disease; and if it is affected, only this rise of temperature for a period of several hours.

The CHAIRMAN. Recalling your attention just briefly to the southern dairying, I notice you say in your report that Louisiana has furnished an assistant to supplement the work of the dairying division working in that State. Have any other States done likewise?

Doctor MELVIN. North Carolina.

The CHAIRMAN. From the other States, excluding Louisiana and North Carolina, have you had any word or act of recognition or appreciation from the State authorities, or from the communities, out-

side of the immediate individuals with whom the work was being done.

Doctor MELVIN. Not to me directly. It may have come to the dairy division, but it has not been called to my attention.

Mr. LEVER. What do you mean, Mr. Chairman, by encouragement—acts of the legislature, or the expressions of a certain set of men, or what?

The CHAIRMAN. I meant anything in the way of resolutions of farm organizations or dairy organizations, or any other method by which public sentiment gets itself expressed.

Mr. LEVER. I might answer for my own State, that nearly every newspaper in the State has heartily indorsed the work of Doctor Melvin's man down there, Mr. Rawl. He visits a town and builds a silo and gives information, and the county papers come out with flaring headlines about what good must come out of it. I take that as expression of public sentiment somewhat.

The CHAIRMAN. That is what I mean.

Mr. LEVER. Yes; there is no doubt about the expression of encouragement.

Mr. COCKS. Does this tubercle bacillus affect the health of the cow?

Doctor MELVIN. It does to a very great extent. These men lecturing and investigating dairy methods say that it does, and they have also been imparting a great deal of information to the cattle owners there as to the different methods of destroying the tick.

The CHAIRMAN. Has any other member of the committee anything further to ask Doctor Melvin upon any subject connected with his Bureau?

Doctor MELVIN. I might add that the work of these men is not along certain narrow lines. They have also imparted information as to the eradication of tuberculosis and things of that character. The work is not entirely with regard to producing milk and making butter, but it also bears on other subjects of general interest in the dairying and cattle industries.

Mr. POLLARD. Regarding page 41 of his report, I would like to ask the Doctor a question as to the treatment of hog cholera by vaccination. I would like to have the Doctor state for my own information just what the plan is that the Department has promulgated for the treatment of hog cholera successfully, whether they have reached the point where it has become practicable and they can apply it.

Doctor MELVIN. It has hardly gone to that stage yet. Those that are now using it are trained in the technique of applying the remedy, and whether it will become generally practicable or not I can not state at this time. After we had determined that this was a preventive for hog cholera we took the question up with various experiment stations with a view of having the people of the various States obtain this remedy from these experiment stations rather than look to the General Government to provide it for them. The treatment consists in the subcutaneous injection of diseased blood and serum from a hyperimmunized hog—that is, a hog that is immune to hog cholera and has been subjected to reexposure through diseased blood, so that it acquires a very high degree of immunity. The serum then from the blood of these hogs, together with diseased blood, is injected subcutaneously into hogs. Several of the experiment stations have undertaken investigations along this line to supply themselves

with these immunized hogs, with a view to extending it to the hogs of the respective States. I can say that so far the work, not only that we have conducted ourselves, but of these various States, has been very satisfactory, but it has been confined to skilled operators, and whether it can be generally adopted or not I am unprepared to say.

Mr. POLLARD. Are your scientists able to go into a lot of hogs that are infected with this malady and by applying this remedy prevent the continued mortality of the herd?

Doctor MELVIN. Yes, sir; they have done that.

Mr. POLLARD. After it has broken out?

Doctor MELVIN. Yes, sir; not only our own men, but in some States. In Missouri Doctor Connaway has been doing this work.

Mr. POLLARD. What per cent can you save in a herd of that kind?

Doctor MELVIN. I do not know definitely. I think I would be safe in saying 95 per cent.

Mr. POLLARD. That is remarkable.

Doctor MELVIN. We have gone into herds where the disease was prevalent and treated one-half the herd and left the other half untreated, and nearly all of the untreated hogs would die and the others would survive. That has been done in several instances.

Mr. POLLARD. But, as I understand it, you must have an animal that has had the disease, or is in some way made immune to the disease, and into that hog you inject virulent virus from an animal affected with the disease.

Doctor MELVIN. So as to produce a hyper-immunity.

Mr. POLLARD. Yes; and from that animal you make a virus that you inoculate the sick herd with.

Doctor MELVIN. Yes, with blood and serum from this hyper-immunized hog.

Mr. BEALL. Is there any way by which you can distribute that virus upon request, by which the Department could prepare and distribute that virus—that vaccine matter?

Doctor MELVIN. We have sought rather to have it distributed by the various State experiment stations to the people of their own States, rather than by the General Government.

Mr. BEALL. It can be distributed. It is not necessary to have one in each herd that may be affected to prepare that matter?

Doctor MELVIN. No, sir; it can be distributed.

Mr. RUCKER. About what is the cost per head of treating a herd?

Doctor MELVIN. It has not reached a commercial stage yet.

Mr. RUCKER. You do not know?

Doctor MELVIN. We do not know at the present time; no, sir.

Mr. POLLARD. Are you cooperating in any way with the Nebraska State station on that work?

Doctor MELVIN. Not on this work. I think they were not prepared to take it up. Minnesota, Missouri, and Arkansas have all taken up this work. Illinois is preparing to take it up; and Iowa also.

Mr. GILHAMS. How is it as to Indiana?

Doctor MELVIN. I do not think Indiana has done anything yet. I am not certain, however.

The CHAIRMAN. I notice you omitted the specific appropriations for the elimination of certain diseases of animals in the State of Minnesota. Is that because you have finished that work?

Doctor MELVIN. No, sir; we have not finished that work yet. The object in leaving out these words was this: This \$5,000 was originally taken from the amount for general expenses and set aside for this particular work. It has not so far cost as much as \$5,000 in any one year, and if this was allowed to return to general expenses, any part of it that was unused could be used in any other direction.

The CHAIRMAN. You expect to continue the work in Minnesota?

Doctor MELVIN. Yes, sir.

The CHAIRMAN. What are you doing there especially?

Doctor MELVIN. We are studying a disease of horses known as "swamp fever." Our results have been very satisfactory and we have been able to determine that it is a communicable disease and transferable from one horse to another. We are now studying the methods of treatment, and they are endeavoring to determine in what way it is communicated ordinarily from animal to animal.

The CHAIRMAN. Are there any noteworthy changes in the salaries you are paying your scientists under your lump sum?

Doctor MELVIN. We have made considerable increase in the salaries of our veterinarians engaged in our field work, meat inspection, etc. That was made necessary in order to obtain additional men and to retain those that we did have. This averaged about \$200 to a man. In our scientific forces there has been some increase, and I should say about the same proportion of increase, perhaps.

Mr. POLLARD. I would like to ask the Doctor what is the object of the experiment which he discusses on page 53 of his report, where he says that animal breeding has started at several stations, and so on. What is that work and what is the object of it?

Doctor MELVIN. That is an experiment to try to determine if we can either prove or disprove some of the theories that have been held for many years with reference to cross breeding and in-and-in breeding. For instance, we have one experiment in telegony, which is the old idea that when an animal has given birth to young—say a certain breed of dog—that its progeny thereafter, even from a different breed of dog, would have some of the characteristics of the first father. We are carrying out some experiments along that line to determine whether there is any truth in this old idea or not.

Mr. LAMB. I thought that was admitted everywhere?

Doctor MELVIN. I do not think it has ever been definitely proven.

Mr. LAMB. No?

Doctor MELVIN. It has considerable bearing, for instance, in the progeny from horses. There is a great deal of dispute as to whether the progeny of a mare should be considered as a type of a certain breed when this mare has had previous foals by another breed of horses.

Mr. HEFLIN. I have noticed that myself. You may breed a fine-blooded mare to a jack, and after that put her to a fine-blooded stallion and the first colt from the stallion will have some of the characteristics of the mule, will be rough haired, and with some of the other characteristics of a mule.

Doctor MELVIN. We have been endeavoring to establish the fact of these matters.

Mr. LAMB. We know that, sir.

Mr. BEALL. I have frequent requests, Doctor, for vaccine virus for blackleg in cattle. Does that operate in somewhat the same way as the vaccine you spoke of in reference to cholera in hogs?

Doctor MELVIN. Blackleg vaccine is made from the flesh of animals that have died of blackleg. It is attenuated by heating it for a definite length of time, and it has the power to render an animal immune when this powdered flesh has been injected as an emulsion into a susceptible animal.

Mr. BEALL. Is that a very common disease among cattle?

Doctor MELVIN. Yes, sir; it has been very prevalent among young stock. And the higher the breed of stock the more susceptible they seem to be to the disease.

Mr. BEALL. Has the rate of mortality been high in cattle affected that way?

Doctor MELVIN. Yes, sir; I think it is given in this report.

Mr. POLLARD. The mortality is recorded as being very low in that report, and I was very much surprised at it. It used to be very much higher than that.

Secretary WILSON. It is being exterminated. If you would muzzle every dog in the District of Columbia for three or four months you would exterminate rabies. If we could kill all the cattle affected with the disease we would exterminate the disease.

Mr. POLLARD. I know we lost 50 per cent of our cattle in my country, and after it had run for a length of time we got some virus and inoculated our herds and we never lost another animal.

Doctor MELVIN. The Department furnishes this vaccine virus in large quantities to different States, and they distribute it among the stock owners. In that way they can obtain it much quicker than if they applied here in Washington.

Mr. RUCKER. Do you furnish it to them for free distribution?

Doctor MELVIN. Yes, sir.

Mr. RUCKER. My understanding is that they sell it at 15 cents a dose.

Doctor MELVIN. It is possible that your State people may prepare it themselves.

Mr. RUCKER. In that connection permit me to say that I have called on the Bureau for a great many doses, running up into the thousands, and I have had a great many reports, and a great many interviews with people who have used it, and without exception it has given satisfaction, and it has been a great help to them.

Doctor MELVIN. In this report of 1906 it is stated that the per cent of mortality is forty-eight hundredths of 1 per cent, and that previous to the use of vaccine it was formerly as high as 10 to 12 per cent.

The CHAIRMAN. If the members of the committee have nothing further to ask Doctor Melvin, and he has concluded his statement, I am sure we would all be glad to hear from the Secretary touching any matter connected with the work of this Bureau that he would like to emphasize or comment upon.

Secretary WILSON. Mr. Chairman, I helped to organize this Bureau when I was a member of this committee in the Forty-eighth Congress, and I have had some knowledge of it since. We had animal diseases running riot in the country at that time, and it seemed necessary that there should be some general supervision by the Federal Government, with jurisdiction reaching farther than State lines. We had disease in the country at that time which had to be dealt with

summarily, and the Bureau was organized for that purpose. It has grown as you have noticed. The latest matter being discussed was this blackleg vaccine. The theory of the scientific work of this Bureau and of all the Department has been that as soon as something new and valuable has been demonstrated, the Department shall cease its production and let commerce take hold of it; but there is an exception with regard to this vaccine. The people quite often are not able to get reliable vaccine, and it costs us so little, only the salary of the man who makes it, probably a mill or two for a dose, that we thought we should supply the needs until the people should be supplied from sources that were entirely reliable. It is the same way with tuberculin. A large cattle owner down in North Carolina had a beautiful herd of cattle, and he wanted to have them healthy, and he bought tuberculin in the market and tested them every year, with no results, and he was proud of his herd; but he became suspicious and he sent up here and got our tuberculin, and he found that half of his animals were tuberculous.

And so we continue making some of these things, in order that there may be some one place in the United States where the people can get the pure article. And in speaking of the work of the Department of Agriculture generally, it may be said to be suggestive and educational. I have been nearly eleven years Secretary of Agriculture, and my great object has been and is to get competent men. It is not a question of money with me, as much as to get competent gentlemen to expend that money, and so we generally have to take the young fellow who is a graduate of an agricultural college, if we can get him from that source. If we can not get men there, we have to take them from the nearest to that, and put them under our ripe scientists and train them. Our Department is a university for the agriculturist, and the only one in the world. We are called on to do an immense deal of work that the States might do, and that I am well satisfied that the States some day will do; but they have difficulty in getting trained men to do the work.

You are appropriating money here, gentlemen, for over 2,000 specialists, over 2,000 men who are making research all the time, or conducting demonstrations, for the benefit of the man who works in the field with his coat off. As the States become stronger, as the staffs in the experiment stations become stronger, and the agricultural colleges teach more thoroughly, there will be less need for doing as much, perhaps, in Washington, unless we keep going into new fields; and while there is any field unexplored it is the cheapest way in the world to have it done, to have it done here at a central source where the scientist is ready to take care of it. I always have a good deal of hesitation when the scientists of the Department come to me, as Doctor Melvin did, and propose that I ask you for a certain sum of money to inquire into interstate movements of dairy products, similarly as we are inquiring into interstate movements of meat products. It looks as if it would be just about as expensive to do the one as to do the other.

Mr. POLLARD. May I ask you a question there?

Secretary WILSON. Yes, sir.

Mr. POLLARD. Is not this plan that is proposed in this section carried to a great deal further extent that your present method of investigating our meat products under existing law?

Secretary WILSON. No; they are just about the same.

Mr. POLLARD. I understood from Doctor Melvin's presentation of the case that the idea was to go and examine the dairy herds, and we never under the present law go and examine a herd of cattle before it reaches the slaughtering place.

Secretary WILSON. Yes; we examine them in the market.

Mr. POLLARD. In the market, but not on the farm.

Secretary WILSON. It is pretty much the same thing. The conclusion that Doctor Melvin and I reached was that we would raise the question to you whether you desired to have us do that; that is what we concluded. I hesitate to launch the Federal Government into new work if it can be avoided and can be done as well otherwise, but I thought it might be interesting to you and to the people of the country to get information along these lines with regard to the extent to which tuberculosis is found in herds of the country, particularly dairy herds, and along the same lines as the work has been done in the District of Columbia. We have to live here ourselves, to live here the year around—most of us—and we do not like to eat impure food, and we do not like to drink impure milk, and so we inquired into the sources of milk for the District of Columbia; and we find that in these States from which the supply comes to the District there is 18 per cent of tuberculosis, as Doctor Melvin has told you. That is what the doctor found in Virginia and Maryland among the herds that supply the milk for this city which you and your families are using. The authorities of the city of Washington took very vigorous action. The President got interested in it and gave commands along certain lines, and I think that they are getting in touch with the farms that produce the milk, and I sometimes thought in their zeal they were going too far in requiring this, that, and the other thing; that is, requiring more than the farmer is able to bring about. But there is no doubt but that this District is looking more sharply into the conditions of the wells on the farms that supply milk to this city, and conditions of the cows on the farms that supply milk to this city, and so forth.

It has been demonstrated lately by one of our men (Doctor Schroeder), that the bacillus is carried in butter; I suppose it is carried in cheese also. It lives a long time in butter. It lives in milk, without any question, as the Doctor has shown you. Now, we might—and that was my theory, and I think that the Doctor probably agrees with it, and I think that the chairman of the committee suggested that you do so—cut that section in two and inquire into the condition of the dairy products that go into interstate commerce, and report to you a year from now and let you know what the condition is. It may be worth while to spend as much on dairy products as you are now spending on meats, because the health of the American people is worth far more than you are appropriating now. There may be justification, and I suppose you would like the justification.

Now, our people are prone to ask the Federal Government to do things for them; they are prone to do it, and the disposition of the Government has been to help the people where they send out a Macedonian cry along certain lines, and there is always a nice question how far the Federal Government should go; but I think it is safe to work

on this basis, that what is being done is done along educational to introduce work, to educate people to do that work, and as we educate men in our force we are getting ready to supply the State cultural colleges and State experimental stations with better-quality men than they have in a great many cases, and that is one of the works that is being done now. We are preparing strong men out in all directions. You had an instance of this day before yesterday when you were discussing something with Mr. Moore, who wanted to train some men for meteorological work; fourteen, I think, I wanted. When I came here first I inquired into the source which that Bureau got its help, and I found that it had to take from the ground and train them up, and I suggested that where our observers were located near the university they be required to prepare themselves to lecture at the university, and instead of getting laboring men to help them at the stations, they should get schoolboys and instead of giving the laboring man \$50 a month, they should give two schoolboys and give them \$25 a month apiece, and let them do the work, and we are getting our men now to a considerable extent from these sources.

In our road work there is a great diversity of opinion in the minds of men in Congress and outside of Congress in regard to how the Federal Government should go. You have been asked for very large appropriations. We think we should confine ourselves, until we are instructed otherwise by you, to educational work, and to that end we will keep half a dozen young men all the time, graduates of engineering schools. We bring them in after they have graduated and teach them road engineering, so that when a State wants a man they can get him; and we are supplying the States with men along these lines. These are illustrations of the effect of the work you are having done by the Department of Agriculture, and I do not think it can be settled on any basis except on the basis of common sense how far we shall go in this bureau and how far you shall go in that bureau. Our work in the South on dairy lines. The first idea that occurred to me was, "Those people can not make ice down there. We ought to send men down there and show them how they can make good butter without ice." Of course I have seen that done, good butter made without ice.

So we are helping those people to begin. We endeavor to get instructors from their own agricultural colleges and experimental stations down there. I find that men work best in neighborhood conditions of which are familiar to them. Emergencies come. The boll-weevil pest came, and it has spread. It came to one State and is now in five. It is a question of life and death for a great many people down there, and so we are at work giving demonstrations to those people how to improve their incomes and grow crops of cotton in defiance of the boll weevil, and grow other things. We have helped to spread alfalfa greatly and the people find the great value of it. An institution of the East, consisting of philanthropic citizens of New York who wanted to teach better ways of living and give religious instruction to people down there, have found that it is probably wiser to fill a man's stomach before you preach to him; and so we are making our plans, and so we are advising them to help the poor people, to teach them how to get more money and how to

vate their gardens and rotate their crops, and how to handle their soil, and to get better seeds, and all that. That demonstration work is going on more or less all over the country.

The United States has been settled so very rapidly that every man who took up a farm was not a farmer, and he was not the son of a farmer, and there were not any farm traditions in his family, and he had to learn. The men who have been good farmers in the United States, and who have been educated even in old farming families, have found it one of the most profitable vocations in the land, men who understand the business. But there are so many of our people who do not understand all those things; and it is wise, I think, for the Government to help them. They naturally call upon you. If anything is the matter, somebody will say, "Write to your Congressman. Send to your Senator. Get something done." They should go to their representative in the State legislature to begin with. We send everything we can to experiment stations, along the line of investigation, that we can get the stations to do, and the moneys you have been giving these colleges and stations during the last year or two will help greatly in this. The Adams bill is doing a great deal of good. It is strengthening those stations, and that makes more work being done out in the country, and less being called for from Washington. The work of the Department will probably never be completed, because conditions change all the time. Invasions of pests and diseases come all the time. It will take a good while for the scientists of the Bureau of Animal Industry to help do the work as they must, and indicate how it should be done, as they best can, toward the extermination of tuberculosis. That will have to be done. The number of tubercular hogs that we find in our inspection is very great, and the number is growing, and the packers have gone to the length of refusing to buy hogs at all from certain districts. They will not put a price on them, because they sometimes get 50 per cent of them tubercular.

When it comes to the dairy cow, it is entirely practicable for people to get rid of that disease if they will take hold of it. The States will take hold of it. We are ready, where we have our inspectors in the packing houses, to determine whether a product is fit for food or not, and the percentage that is not fit for food is not very large. If a man has 18 per cent, something like one-fifth of his herd, if he has 20 cows he has 4 tubercular animals. Of those 4 tubercular animals probably not more than 1 would be unfit for food, so that there would not be a very great deal of difficulty, if the people would take hold of it in a rational way. They did take hold a few years ago, but they started to burn and destroy everything. There is no necessity for that. Our people find tubercular animals every day, and in regard to the severity with which our inspectors deal with those tubercular animals which pass before them every day, in one packing house, in order to be sure that we were thorough, we called upon a board of very prominent gentlemen to pass upon our inspection, and they came to the conclusion that if we went wrong in any direction, it was in the direction of severity. We are more severe in our inspection than they are in any other country in the world. The health of the American people is a very interesting subject with the American people.

I do not know, Mr. Chairman, that I should say anything further to-day. There are other lines of our work that will come up before you that will suggest other thoughts. It will probably be better for me to speak briefly now and again with regard to our policies, but I think with regard to the pending question, if you instruct us to inquire and report to you a year from now what the condition of the dairy cattle of the country is, we can do it without very great expense. We have men to do it; we do not have to get new men, and it will not be very expensive; and when it is done then the question will come whether you think you should take further steps.

Mr. Cook. I did not quite understand your reply to the question of Mr. Pollard as to the inspection of the herd on the farm.

Secretary WILSON. The way Doctor Melvin conducted his investigation he found 18 per cent tubercular cattle.

Mr. Cook. No; I meant in regard to the inspection of the live herd. Mr. Pollard asked you a question as to whether it was the intention as I understood his question, to inspect the herd on the farm.

Secretary WILSON. I think you would have to do something of that kind. We do it this way to-day. This has not been brought up and I might state it. Doctor Melvin advertised and said: "If the owners of herds in this neighborhood would like to have their cattle inspected for tuberculosis, we will do it confidentially, and not advertise it." We would have to do that if we were to get an intimate view of the herds of the United States in a good many neighborhoods. That is about what we would do.

Mr. Cook. You spoke about the inspection at the yards.

Secretary WILSON. Yes; we would have to go into the barns.

Mr. Cook. What I would like to know is whether it would be the intention to send the inspectors of your Bureau to inspect any herd on a farm?

Secretary WILSON. Yes. We would have to say this. Suppose we wanted to know what the condition of things was around Denver. We would find less tuberculosis there, probably, than almost anywhere else, because you people live in a healthy atmosphere out there and you do not have it. But suppose we went there; we would tell the gentlemen who went to Denver, advertise and say: "We will inspect your herds for tuberculosis, and we will tell you what we find and we will not tell anybody else." Then next winter we will come here and tell this committee the results of our investigation.

Doctor MELVIN. I would like to read a form of agreement we have in consideration of this free test. It reads as follows:

UNITED STATES DEPARTMENT OF AGRICULTURE, BUREAU OF ANIMAL INDUSTRY

Agreement.

In consideration of the testing of my herd of dairy cattle by the Bureau of Animal Industry of the United States Department of Agriculture, and the assistance of said Bureau in enabling me to produce milk free from the contamination of disease germs, I, ———, owner of ——— dairy herd, do hereby agree as follows:

1. I will cause all animals that react to the tuberculin test, and which show other symptoms of tuberculosis, to be slaughtered within a reasonable time under United States meat inspection, and I will cause the carcasses of such animals to be disposed of according to the meat-inspection regulations of the Bureau of Animal Industry, based upon the lesions found upon inspection.

2. I will cause all animals that react to the tuberculin test, but which show no other evidence of tuberculosis, either to be slaughtered and disposed of

herein provided for animals which show also other evidence of tuberculosis, or I will cause such animals to be removed from the dairy farm upon which the healthy animals of the herd are maintained, and I will cause the diseased animals to be segregated from the healthy animals, and thereafter they shall remain so segregated.

3. In all cases where the milk from such segregated reacting animals is to be used for any purpose whatever I will cause the said milk to be sterilized.

4. I will cause the young from said segregated reacting animals to be removed from their mothers at birth, and will not permit the said young to suckle their mothers.

5. Any part of my premises contaminated by reacting animals will be submitted by me to a thorough disinfection under the direction or supervision of the Bureau of Animal Industry.

6. All cows owned by me—both healthy and tuberculous—I will mark in such manner as to enable their identity to be retained, and I will change the location of no cows except after due and timely notification to the Bureau of Animal Industry.

7. I will add no cattle to the said herd which have not passed a tuberculin test administered by an authorized agent of the Department of Health of the District of Columbia or by an agent of the Bureau of Animal Industry.

8. I will comply with all reasonable sanitary measures which are indicated by the department of health of the District of Columbia or by the Bureau of Animal Industry.

In witness whereof I have signed this agreement this — day of —, 1907.

Owner of the — Dairy Herd,

(Address) —, —.

Witness:

Mr. POLLARD. I notice in that contract there is a clause where the owner of the herd agrees to segregate the infected cows.

Doctor MELVIN. Yes.

Mr. POLLARD. And that the calves that drop from those cows shall also be segregated, and not permitted to have the milk from their mothers. Have you made any experiments that indicate whether or not those calves that come from infected cows inherit the disease, or whether it only comes from milk they get from their mothers?

Doctor MELVIN. The observation of different scientists for a number of years, both with human beings and animals, has demonstrated that it is very, very rare indeed that the disease is hereditary. In nearly all cases it is contracted after the birth of the young. It is not an impossibility; but it is very, very rare that it is hereditary. In fact, it is so rare that it is hardly considered necessary to take further steps in the matter.

The CHAIRMAN. I am sure the committee is under obligations to the Secretary and also to Doctor Melvin for the information given us.

At 12 o'clock m. the committee adjourned until to-morrow, Friday, January 17, 1908, at 10 o'clock a. m.

COMMITTEE ON AGRICULTURE,
HOUSE OF REPRESENTATIVES,
Friday, January 17, 1908

The committee met at 10 o'clock a. m., Hon. Charles F. Scott (chairman) in the chair.

STATEMENT OF MR. BEVERLY T. GALLOWAY, CHIEF OF THE BUREAU OF PLANT INDUSTRY, ACCOMPANIED BY MR. ALBERT WOODS AND MR. S. A. KNAPP.

The CHAIRMAN. Dr. Galloway, the Chief of the Bureau of Plant Industry is here, and I think we will ask him first of all to go back over the estimates and give us such information as he may desire regard to any changes that may appear.

Mr. GALLOWAY. Mr. Chairman and gentlemen, do you wish me to take up the items just as they occur in the estimates?

The CHAIRMAN. Just as they occur in the estimates, confining your remarks to whatever changes appear. The first change I notice is the top of page 14, where you make a change in the title.

Mr. GALLOWAY. Mr. Chairman, that change is made simply for purpose of enabling us to utilize the services of this person either as clerk or artist. We can use the assistant either way. Occasionally we have to have artist work done, and if there is no longer necessity for the artist work we can use the person as a clerk. That is all there is to it.

The CHAIRMAN. By "artist" there you really mean a photographer?

Mr. GALLOWAY. I mean a person who has the qualifications for making drawings from specimens of either living plants or dried specimens, as occasion may arise. In connection with our work on fruit it is often necessary that we should have some one to make drawings of the fruits that come in, or the specimens that come in, as a matter of record, and for the farmers' bulletins or papers, or, for the Year Book, colored illustrations, various illustrations that require artistic help. The main portion of that work is done by the Division of Publications, but all of the Bureaus have a few of these artists to do special work.

If there are no further questions on that matter the next change is further down, where we have asked that 1 clerk or messenger at \$480 be dropped. It seemed unwise to carry a clerk at a salary of \$480; we can not get anyone from the civil service for that pay, and while we could use the messenger it seemed desirable that we simply omit the place and not have it carried in the list of statutory positions.

The CHAIRMAN. Have you been unable to fill it?

Mr. GALLOWAY. We have kept it filled in one way or another, we can not get a clerk who could really be classified as a clerk; there is a general sentiment prevailing throughout all the Departments that these minor places should be either eliminated or given some other titles. Hence we are working toward that end. That has been one of the objects of the Kepp Commission investigation.

The CHAIRMAN. The next I notice is 5 gardeners, and increase 3 submitted.

Mr. GALLOWAY. This is really not an increase, it is simply a change of men who have been doing both gardening and firing work in c

nection with these outlying buildings we have, who will go back to their duties as gardeners.

The CHAIRMAN. How much of their time have they been putting in heretofore as firemen?

Mr. GALLOWAY. During the winter months they fire these isolated plants. We have about 20 to 25 separate buildings, and we shall drop quite a number of these men when we get into our new building. Some we have kept because they are men we desire to use as gardeners, hence we have merely changed their position on the rolls from firemen to gardeners.

The CHAIRMAN. Since they are no longer firing in the winter time what will they do?

Mr. GALLOWAY. They will work in the greenhouses in the winter as gardeners.

The CHAIRMAN. Have you enough work for them?

Mr. GALLOWAY. Yes; we have work not only in connection with the gardening work, but these men are also used in the packing and sending out of plants. We have a large amount of that kind of work to do, especially in connection with the Congressional seed distribution, strawberry plants and grapevines, the packing of bulbs, etc. This work requires a considerable force during the winter months, and we can use these men there as gardeners in the general greenhouse and propagation work.

The CHAIRMAN. In the note a little below there you drop 3 firemen; that is on account of going into the new building?

Mr. GALLOWAY. On account of going into the new building.

The CHAIRMAN. Is there any connection between the 3 firemen dropped here and the 3 mentioned in the note?

Mr. GALLOWAY. That is additional.

The CHAIRMAN. So that it is really a discontinuation of 6 firemen?

Mr. GALLOWAY. Yes, sir.

The CHAIRMAN. On the next page you drop 3 watchmen at \$720 and 2 watchmen at \$600 each. That is also in connection with the new building. Passing for the present the general expense item, I would like to inquire whether there are any particular changes in your salary roll under the lump sum.

Mr. GALLOWAY. Any changes from what we are working under at the present time?

The CHAIRMAN. Yes.

Mr. GALLOWAY. No, sir.

The CHAIRMAN. You propose to let this roll stand for the coming year practically as it is?

Mr. GALLOWAY. Practically so. In connection with the new work we must from time to time bring in assistants, but the roll as it is at present made up will be virtually the same for the coming fiscal year.

The CHAIRMAN. Then, unless some other member of the committee has questions to ask, I believe you might as well take up your paragraph under the head of general expenses, on page 15, and submit whatever remarks you may wish to make under each paragraph under each head.

Mr. HAWLEY. Was the report submitted to us like this of Doctor Melvin's?

The CHAIRMAN. This report has not been.

Mr. GALLOWAY. We have been making every effort to get out our annual report in time for the work of this committee. There is one feature of the Department that has to be considered, however. We can not very well complete our field investigations and close the work for the season until very late in November. If we try to complete the work and get it ready for publication earlier than that, we must necessarily omit some things that would have to be carried over to the next year, and that makes a statement of the work rather awkward, so that under the Secretary's direction we carried the statement of the work this year up to the 1st of November and then submitted our annual reports, and they are being issued now. We had the page proof of our annual report yesterday, but it will be several days before it is published.

The CHAIRMAN. Do you remember when the copy was submitted to the printer?

Mr. GALLOWAY. It has been at least six weeks or two months since the copy went to the printer. That is about the usual time unless an urgent request is made for immediate publication. Of course, it could be published much more rapidly than that, but ordinarily it takes from six weeks to two or three months to get through one of these documents.

The CHAIRMAN. I dropped a note to the Public Printer yesterday saying to him that these reports were very much desired by this committee, and I suppose we will have them as soon as they are ready. Proceed, Doctor.

Mr. GALLOWAY. Mr. Chairman, I may say for the information of the members of the committee that the work of the Bureau of Plant Industry is very varied in character, hence it is necessary to discuss it from the crop standpoint. We cover practically the whole field of plant culture, including work on the diseases of crops, the improvement of crops by breeding and selection and the introduction of new crops, the handling of fruits, in harvesting, transportation, and shipment, and many other lines of investigation which I will discuss in detail as we go along.

The work of the Bureau for administrative purposes is divided into 36 main groups, and under these main groups we have nearly 700 different projects. That is, our work is organized and conducted on a project basis, and this project or group of projects is in charge of men familiar with the problems. That is, a man is put on a certain problem. For instance, let us take the question of the improvement of cotton. Cotton growing is developing along certain definite lines, and one of the important things is the improvement of the varieties that we now grow. A few years ago we began the improvement of a certain type of long-staple cotton for the uplands. There are a number of types of long-staple cotton, but they are shy bearers. We wanted to get one that could be grown generally on the uplands and produce a long staple. After several years we have produced such a cotton and will be ready to send out some of the seeds this year. That is typical of our projects; and, as stated, we have 700 of these, covering all kinds of plant culture.

Mr. LEVER. What is the difference in price of the long-staple upland cotton and the ordinary cotton?

Mr. GALLOWAY. The long staple this year is selling for 15 to 19 cents.

Mr. LEVER. The ordinary price is about 11 cents?

Mr. GALLOWAY. Yes; for the ordinary cotton.

Mr. LEVER. How is it in point of yield?

Mr. GALLOWAY. What we have been striving for is to get a long staple that would yield as much as the short staple, and that we have succeeded in doing. It is from the type known as the "Russell," which is giving three-fourths of a bale to a bale to an acre, just about what the short staples are yielding on the same land and under the same conditions. There is great demand for a long-staple cotton throughout the South, and we have been trying this cotton in North Carolina, South Carolina, Georgia, and Alabama, and it has held its own. This is the sixth season we have grown it, hence we think it is sufficiently established to warrant us in making a distribution of seed.

The CHAIRMAN. When you send the seed to the farmer, do you follow up the seed with that farmer?

Mr. GALLOWAY. Yes; we follow it up; and we keep a record of every man who gets these improved seeds, and in the course of the season we have some of our cotton men visit the plantations, if it is practicable to do so. In all cases we can not do that, of course; but we keep in touch with the farmer and the farmer's work, to the end of seeing that he thoroughly understands what are the essentials of keeping that seed true to type. In addition to that line of cotton work we have for the last three years been gathering, wherever we could secure them, the very best types of cotton that have been developed by individual farmers. Here and there throughout the South you find men who have been for years improving their cottons. The cottons are localized and they are improvements on the standard varieties that are grown around them. We have been distributing this cotton in the regular Congressional distributions, giving every Southern Member a number of bags which he can send to his constituents, following this up, as we do the types, with breeding. We recognize that our best results are going to come from detailed and continued breeding work such as I have outlined. We have that work going on in 8 or 9 States, especially in the boll weevil sections, where we are developing particular cottons for boll weevil conditions.

Mr. Woods. The "Columbia" got the gold medal at Jamestown.

Mr. LEVER. That is named for Columbia, S. C.

Mr. Woods. Yes, sir.

The CHAIRMAN. Suppose you take up your paragraphs under the head of general expenses and comment briefly upon each of the subjects mentioned, letting us know particularly in reference to any new work you are doing.

Mr. GALLOWAY. Do you have reference to the lines of work where we have asked for increases, or to all lines of work?

The CHAIRMAN. I think you might run through, briefly, all lines of work, and then we can discuss in greater detail the lines in which you are asking an increase.

Mr. GALLOWAY. I might devote just a few minutes to each of the important lines of work so as to give the committee an idea of the different kinds, then come back and discuss details.

The CHAIRMAN. Yes.

Mr. GALLOWAY. In connection with the 36 different groups of problems we have, of course, the necessity of considering the administrative features, and the first series of projects, as we call them, is con-

ned with the work of the office of the Chief of the Bureau. This work has for its object the general administration of the entire Bureau, the handling of all administrative affairs, the keeping of accounts and records, and all work of that nature. Then as a matter of administrative work, we have a group of projects under the assistant chief, Mr. Woods. He looks after certain things that the Chief of the Bureau does not directly look after, more particularly the different matters connected with the different laboratories we conduct. Then after the administrative work we have a laboratory of plant pathology. This laboratory is designed for the purpose of studying the technical questions connected with plant diseases and methods of treatment. The various scientific investigations are carried on in this laboratory, and when the work has been brought to a sufficient point to warrant us in making field demonstrations, it is turned over to other men in charge of different projects and there the field work is done. Last year we spent for the administrative work of the office of the chief \$61,571, for the office of the assistant, \$32,775, and we are asking for no increase this year. In the laboratory of plant pathology were spent last year \$20,867.

The next group of projects, diseases of cotton and truck crops, has for its object a study of the diseases of cotton and truck crops that are grown throughout the South and other sections of the country. A good many of these crops are affected with serious diseases, and these investigations are to find out what the diseases are and methods of preventing them, together with practical demonstrations in the field to farmers and others of the manner in which the diseases may be prevented.

Mr. BEALL. Can you give us some illustration of your work in that connection?

Mr. GALLOWAY. Yes; take for example cotton. Eight or nine years ago we began the study of the sea-island cotton wilt, and after various investigations we found that this condition was due to a fungus which lived in the soil and attacked the roots. We made an effort to attack this by the application of fungicides to the plants, but none of these were successful. Our men engaged in the work, however, noticed that plants here and there in the affected fields were free from the disease; they would live while the others would wilt. That suggested the possibility of securing a wilt-resistant strain, and with that we began experiments, with the result that the wilt has been practically overcome and wilt-resistant types have been developed. In addition to that, it was found necessary to grow a forage crop, a cowpea, with the cotton, and that was also affected by the disease, which made it necessary to secure a wilt-resistant cowpea. The cowpea known as the Little Iron, is the standard wilt-resistant type, and is grown by the cotton men throughout the sea-island region. There are other diseases, such as a cotton root rot, occurring all over the southern country and in many of the Southern States, that we have studied and handled in very much the same way.

Diseases of the bolls and of the leaves, are reached by other methods.

Diseases of fruits is another group also being studied, and I may cite as a concrete case in this connection the work we are doing on pear blight. That is a bacterial disease of the pear which has already caused two or three million dollars' damage in California, and it is

spreading to the pear orchards of some of the adjacent States, especially Oregon. The cause of the disease is well known. The methods of prevention are pretty well understood, and consist mainly in cutting out the diseased wood in the winter months. An experienced man, after a little training, can learn to distinguish the blight readily, and by going through the blighted orchard and cutting out the diseased wood, the possibility of the spread of the disease is removed. The disease is spread mostly through the carrying of the virus causing blight, by insects. A gum is exuded which the insects are very fond of, and after eating this gum they go to the pear flower. The flower is thus inoculated and the disease appears, and very soon the twig is blackened, then the branch, and finally the main tree becomes blackened. The work in California has been mainly in the orchards during the winter, so far as eliminating the disease is concerned, the Department cooperating with State authorities.

The next group of subjects, forest pathology, has for its purpose the study of diseases of forest trees, and especially the diseases affecting the forest trees on the national reserves.

The CHAIRMAN. Just at that point, can you tell us whether there is any duplication in the work you are doing and the work of the Bureau of Forestry?

Mr. GALLOWAY. There is no duplication. We work together. We have a cooperative arrangement to this end. The Bureau of Plant Industry conducts the scientific pathological investigations and carries this work to the point of application—not general application, but experimental application. When we get to the point of general application, we turn it over to the Forestry Service, and their men, in cooperation with our men, go on with the work.

The CHAIRMAN. You have been conducting some experiments in respect to distillation of waste from sawmills?

Mr. GALLOWAY. No, we have not been doing any work of that kind.

The CHAIRMAN. I notice in one of these projects an experiment in the distillation of waste from sawmills for the purpose of producing turpentine.

Mr. GALLOWAY. I do not think we have anything of that sort.

Mr. HAWLEY. What sorts of forest trees are you experimenting on?

Mr. GALLOWAY. Nearly all forest trees are subject to diseases. The more thickly these trees are found, the more subject they are to certain kinds of disease. The Bureau is studying diseases not only of the national forests, but diseases of street and park trees. As an example of a forest-tree disease, I may cite a disease which has this year extended all over New England, affecting the white pine. It is a blight of the white pine. In connection with the Forest Service we are studying that disease to find the cause. The leaves turn brown and blight, and the next season it is more severe, and usually about the third season the trees die in great numbers. It sweeps through a forest of white pine very much as a fire would, destroying the foliage and eventually destroying the trees. The diseases affecting timber after it is cut, are also subjects of investigation. That is one of the most important lines of work we are engaged upon. Telegraph poles, fence posts, and all such timbers are attacked by fungi; and these little organisms cause decay.

The CHAIRMAN. Did you carry on any investigations on fence posts?

Mr. GALLOWAY. Only up to an experimental point. If in the study of diseases affecting the cut timbers we find something that is destroying fence posts, and do carry the work to the point of demonstrating the feasibility of using certain substances, then we turn the use of those substances over to the Forest Service, and they continue the work.

Mr. COOK. Has your bureau made any tests as to white pine and white spruce and red spruce in the forest reserves of Colorado?

Mr. GALLOWAY. You mean as to their preservation after being cut?

Mr. COOK. At any time.

Mr. GALLOWAY. No, sir; what work has been done, I understand has been carried on by the Forest Service. This work was only inaugurated in the past year in connection with the Forest Service, and our work so far has been confined mostly to certain timber diseases in the eastern United States. The insects affecting some of those timbers, I understand, have been under investigation by the Bureau of Entomology in connection with the Forest Service, especially the insects affecting standing timber.

Mr. POLLARD. Have you discovered any preparation that can be applied to fence posts that will protect them from decay? Have you anything along that line of any real value?

Mr. GALLOWAY. Yes; I think we have. That work, I believe, has been so thoroughly demonstrated that it is no longer a question of experiment. Mr. Woods, will you explain for the benefit of the committee the work that has been done by Doctor von Schrenk for the protection of fence posts, and the practical results of some of that work?

Mr. WOODS. The work was started several years ago, and was simply impregnating the base of the post with creosote. The old method of forcing it in by pressure was too expensive, and Doctor von Schrenk discovered by accident that if the posts were allowed to remain in the hot creosote and boiled for an hour or two, and then were allowed to remain in it and cool, the air pressure, 30 pounds to the square inch, would force the creosote in without any other pressure. You could impregnate a 6-inch post, fairly dry, with one boiling. That was tested on quite a large scale, and was found to be entirely successful, and now the forestry people, I believe, have been taking it and exploiting it. We have been doing nothing on the creosoting since the experimental work was completed. They are carrying on the practical demonstrations.

Mr. POLLARD. Are there any places in the country where that plan is being followed generally?

Mr. WOODS. Yes, sir; the telephone people are treating telephone poles in that way on a large scale.

Mr. GALLOWAY. There is no reason why every farmer should not treat his own fence posts. As a practical illustration, I may cite the way we have treated some of these this last year. This creosote or tar oil costs about 6 cents a gallon, by the barrel. It is a waste product. We have secured for our own use a large hogshead and a piece of 4-inch pipe, 8 feet long. We screwed it into the bottom of the hogshead and built a fire at the opposite end of the pipe, just as if we were preparing to scald hogs. You know how farmers do that. Filling the hogshead half full of the tar oil and then putting the

fence posts in and heating the oil and then letting it cool, we can treat 40 fence posts at one time, and it costs about 4 cents a post.

The CHAIRMAN. I think that when the forestry people come before us they will tell us that as a result of their experiments along the same line railroad companies are now using for ties wood so soft that a few years ago it was regarded as entirely useless for that purpose. Those ties which are now made by this process out of those woods endure as long as oak ties. The matter can be more fully discussed when they come before us.

Mr. HAWLEY. Do you find that the diseases affecting the forest trees are the same as those affecting the fruit trees? Is there any danger of infecting the orchards from those forest trees?

Mr. GALLOWAY. Certain kinds of diseases affecting fruit trees also affect forest trees; for instance, there are certain diseases of the roots of forest trees which are quite destructive, and if the forest trees are cut down and an orchard placed on that soil, the orchard trees are likely to succumb to the same diseases.

Mr. HAWLEY. That is true in the West with the peach trees.

Mr. GALLOWAY. Yes; the root is destroyed by a fungus, and the same fungus destroys the roots of various other orchard trees. We have been doing considerable in the way of securing fruit stocks that are resistant to these various soil diseases.

We have a group of work which we call plant-life history investigations, having for its object the study of crop conditions in various parts of this country and other countries, with a view to securing new crops and improving old ones, adapting them to new conditions. Our work has been mainly so far in the Southwest, where the conditions are unusual, a semiarid region; and we are studying the life history of certain crops with a view to finding methods of improving them and adapting them to conditions there. I may cite a recent piece of work which has just been completed. We find that in certain parts of the Southwest the conditions are unusual in the matter of alfalfa growing. The winters are comparatively mild, but the cool temperature is continuous. The ordinary alfalfa commonly grown in this country simply quits growing under those conditions. As a result of our life-history investigations we have found an alfalfa that has the faculty of growing in cool weather. It does not grow as well as the ordinary alfalfa, but it does grow, and that enables us to put it into the southwestern region, and enables the growers to get three or four more cuts than of the ordinary type. We have just published a bulletin on the use of that alfalfa, which has its original home in the high mountains of Peru.

The CHAIRMAN. To what extent is that used in that region?

Mr. GALLOWAY. Just as rapidly as the seed can be secured, and that is a question of some difficulty, because we only secured a very small quantity of the original Peruvian alfalfa, and we are now making every effort to have this grown in the southwestern region.

The CHAIRMAN. Does it grow without irrigation?

Mr. GALLOWAY. It grows without irrigation, but it grows better under irrigation. It is not a dry-land alfalfa, but we have alfalfas that we are working on, as part of our life-history studies, in that direction. Another line of work in connection with our life-history studies might be mentioned. A little over a year ago one of our in-

vestigators, Mr. Swingle, got on the track of an alfalfa that had been grown since 120 B. C. in northern Manchuria, having been brought over there by one of the old Orientals on an invasion made two thousand years ago. It was seen that this alfalfa would be very valuable for parts of the colder northwestern and more or less semi-arid sections, and through correspondence with our minister at Peking we have secured a small quantity of that seed and are introducing it here. But a study of the climatological and other conditions under which that alfalfa has been grown has led Mr. Swingle and those who are interested in this life-history work to believe that there are certain sections where it would be much more valuable than any alfalfa we now possess. That and the other lines described illustrate some of the main features of the work in plant life history studies.

Cotton-breeding investigations have for their object just what the title indicates, the improvement of cottons by breeding and selection; not only by the hybridization or crossing of two distinct types of cotton, but the improvement by selection. The cotton I mentioned a moment ago is an illustration of the improvement of cotton by simple selection, starting with a certain kind of plant and by careful selection year after year improving it. Now we have made still some further improvements, new types, new varieties for certain purposes, by bringing together two related types; that is hybridization or crossing. That always results in more marked changes in the forms than simple selection and gives us in some ways quicker results. Mr. Woods, will you briefly outline some of the salient points connected with our cotton-breeding work that have been brought out by Mr. Shamel?

Mr. Woods. The work has been in progress for several years, and we have already developed the Columbia cotton, which is an improvement for the eastern cotton section. In Texas one of the main propositions has been improving the Triumph, which is one of the finest local varieties, with a large boll, and prolific, but it is our desire to get it a little earlier, and selections have been made with that end in view, and have been successful. Then we have also secured an early maturing selection of Triumph for the sandy lands of the South. The experiments have shown that the cottons must be developed for the peculiar conditions under which they are to be grown. You can not produce a variety on the black lands which is adapted for the lighter soils, and those varieties adapted to lighter soils will begin to vary if you move them to the heavy soil.

Mr. LEVER. Does this affect the staple in any way?

Mr. Woods. If you move the cotton from the soil to which it is adapted to a soil to which it is not adapted, the staple begins to shorten; but by about three years' selection on the soil on which you wish to grow it you can make an increase of about a quarter of an inch in length of staple in the case of Triumph, which is a rather short-staple cotton. In the case of the Columbia, which is a good middling cotton about an inch long, we have increased it a half inch, so that it is now a long-staple cotton, and it is a better long staple in Louisiana than the long staple being grown there. It is not quite early enough, however.

Mr. LEVER. Have you found any difficulty in ginning this long-staple cotton on an ordinary gin?

Mr. WOODS. It can be ginned by modifying the number of teeth.

Mr. LEVER. And running slower?

Mr. WOODS. And running slower.

Mr. LEVER. I know that has been the difficulty heretofore in my section.

Mr. WOODS. In the heavy bottom lands of the South, the lower Mississippi and the Red river, any variety of cotton tends to go to stalk and become a light yielder. Now that the weevil is in there, it is necessary to shorten the growing period, and we have secured a strain of Triumph for this area that is much earlier and will get ahead of the weevil. Of course we have a number of other varieties under improvement also. One of the best of these is a hybrid between the Triumph and Sunflower, which is early enough to escape the weevil, is a heavier yielder than any other long-staple cotton in that region, has a very fine staple, and on the whole seems to be well fixed and promises to be a fine variety for Louisiana and Alabama or south-eastern Texas.

Mr. BEALL. What have you done in the way of developing a variety of cotton for the black land of Texas?

Mr. WOODS. We have an earlier Triumph for the black lands that is very successful; a big-boll cotton. We have several other varieties in progress for the black land, similar to the Triumph. Some of them have the Triumph blood in them. One of them is a local variety which has proved to be one of the finest cottons ever produced.

Mr. BEALL. Several years ago you sent out some seed of a little-boll cotton to Texas. What about that?

Mr. GALLOWAY. Yes. When the boll weevil became acute in Texas, there was a rush for early cottons, and the only kinds of cotton we could get were the little-boll cottons, and they were sent into Texas. They were first sent into Texas by the entomologist, and afterwards we did send some little-boll cottons ourselves. It was the only thing that could be done in those days, because we had no early types. The growers succeeded in growing cotton with the King and some varieties of that type where they would not have had any cotton at all otherwise. We started our breeding work soon after that, and were thus able to secure types very much better than these small-boll types. We are not sending any small-boll cotton into Texas now.

Mr. BEALL. This early type of the big-boll cotton of which you speak—how does the date of its maturity compare with that of the little boll cotton?

Mr. GALLOWAY. Just about the same.

Mr. BEALL. Just about the same?

Mr. GALLOWAY. Yes. That is what we started out to accomplish, to get a big-boll cotton of a prolific type, storm proof, and one that could be picked readily, and as good as the small-boll kinds.

Mr. BEALL. With the boll weevil in the black-land section of Texas, would you be able to secure a reasonable crop of the improved Triumph in time to prevent destruction by the boll weevil?

Mr. GALLOWAY. Yes; we think so. That is what we are working for, and we think it is necessary and essential to recognize these differences in the soil, because those slight differences make a great difference in the maturing of the cotton. Cotton that would mature well on these lighter sandy loams of Texas, when it gets into the black lands, behaves differently.

Mr. WOODS. We have a hybrid of the King which is earlier than anything else.

Mr. BEALL. What is the result of that?

Mr. WOODS. It is a little earlier than the earliest Triumph, on account of the King being so early, but is not quite so heavy a producer as the early Triumph. It is a week or ten days earlier. Then there is a cross of Triumph and Cook's Improved, which is especially adapted to the more southern sections of Texas, and promises to be a good variety.

Mr. BEALL. Do you know anything about the variety known locally in that section as the Rowden cotton?

Mr. GALLOWAY. Yes; we have had that cotton, and it is a good cotton which has been grown quite generally.

Mr. BEALL. How does it compare with the Triumph?

Mr. GALLOWAY. If it had been equally well selected, it would have been as good as the Triumph, but it has not had as good treatment, and consequently you do not get as good results as from the Triumph, as a rule.

Mr. KNAPP. Permit me to add that while the Triumph does not mature as early as the hybrids that have been mentioned, by ten days, it gets ahead of the weevil as soon, because the calix is thicker, and one of the troubles with the weevil is the puncturing of the half-grown bolls. The Rowden cotton has a thin covering of the calix, and the weevil bores these coverings later than it does on the larger bolls, hence in our experiment it was determined unanimously that we could fight the weevil better with a big boll than with a small boll.

Mr. HEFLIN. How is the result?

Mr. KNAPP. That is a good cotton, and has been selected, as well as this Triumph. The Triumph everywhere, as improved by the plant bureau, is giving the best satisfaction we know of, excepting on the rich bottoms of the Red River, where the stalk grows a little too large. The Pruitt cotton of Georgia is giving good satisfaction there.

Mr. BEALL. Some cotton seed was sent me last year that had the name on the little sacks "Upland cotton." What was that?

Mr. GALLOWAY. That was probably a long-staple upland cotton. I do not remember what variety we sent out, but the name should have been on the inside of the package.

Mr. BEALL. I do not remember about that.

Mr. GALLOWAY. We sent out 10 or 12 kinds. We have issued some Farmers' Bulletins on cotton and cotton seed, and on how to utilize the seed.

The CHAIRMAN. Do you distribute those bulletins in any other way except through the Congressional distribution?

Mr. GALLOWAY. Only in so far as applications are made for them, and so far as it is in connection with the work being done by Doctor Knapp, who can use considerable quantities of them; and we have our own lists of cooperators and collaborators to whom we send these Farmers' Bulletins; but the greater portion of them go out through the Congressional distribution.

The CHAIRMAN. As a matter of fact, you depend largely on the work Doctor Knapp is doing to get the work you are about before the people; I mean so far as your cotton breeding or work is concerned?

Mr. GALLOWAY. Yes. Our usual method of sending out such publications is this: Our men, of course, get in very close touch with representative people who know a great many other people who would be interested in the publications, and we make up a list in advance of the people to whom the Farmers' Bulletin should go, and that goes to the man who prepares the manuscript. It is supposed he knows, or he ought to know, better than anyone else, who should receive it, and we are guided largely by his statement as to the number we should ask for, aside from the regular distribution. I have thought that it might be very desirable if there was some general and concerted plan on the part of the Department as to the general distribution and kinds of Farmers' Bulletins, and the relation of the bulletins to the particular interests in the districts. I do not believe there has been anything of that kind.

Mr. POLLARD. Since the Department has taken up this work of improving the different varieties of cotton, has there been any particular increase in the yield of the cotton?

Mr. GALLOWAY. There has been material increase, certainly, in individual cases. Of course in such a wide section of territory as we are covering with this cotton work the variations in the yield from one season to another would offset any increases or decreases through individuals, but there is absolutely no question about the fact that the knowledge with respect to the methods of growing cotton, and the advantages of good seed, and improving seed and selecting seed, has greatly increased in the last few years, and I think this propaganda work we have been doing through sending out seed through the Congressional distribution has worked great good in that direction. If the Congressional distribution does any good, it is certainly doing good in regard to the distribution of cotton seed, because it is in accord with the general sentiment or wording of the act, and it is reaching the people through the distribution of seed they use.

The CHAIRMAN. But the principal benefit from your work has been the development of disease-resisting plants and the instruction in cultural methods, has it not?

Mr. GALLOWAY. Instruction in cultural methods, disease-resisting plants, and the increase of knowledge in reference to the vital importance of getting good seed. This Farmers' Bulletin on the utilization of heavy seed I think it is no exaggeration to say has been worth a half million dollars or more to the cotton growers of the South, because it is demonstrated there that simply by using heavy seed you can increase your yield 15 per cent, by the use of a simple device for separating light seed from heavy seed, and using the heavy seed. That is plainly brought out, so that any farmer can use this method.

Mr. LEVER. The increase per acre would be due to seed selection first and to improved cultural methods also?

Mr. GALLOWAY. Yes, sir; of course. The two go together, necessarily.

Mr. LEVER. And there has been undoubtedly an increase of yield per acre within the last four or five years?

Mr. GALLOWAY. You can take individual counties, and Doctor Knapp has records of numbers of counties in States where he is working which show the increase in output as developed in the shipments at the shipping points from year to year.

The CHAIRMAN. I would like to say to the committee that I asked Doctor Knapp to come here because I thought that after Doctor Galloway had been heard, the committee would be interested in learning from Doctor Knapp himself just the method in which he has been doing his work, and the results from it. He has a very interesting story to tell.

Mr. GALLOWAY. Doctor Knapp is our propagandist, if I may use that word. He takes all these things we have developed and these methods that we have been pursuing, and presents them in such a way to the people of the South that they can not help adopting them. At any rate, they do adopt them.

Mr. LEVER. They want to run him for governor, down in South Carolina.

Mr. GALLOWAY. For many years we have been endeavoring to introduce Egyptian cotton into this country. We import about \$17,000,000 worth of Egyptian cotton, and we have endeavored to introduce that into several Southern States, but so far have not been successful.

Three or four years ago we began work at Yuma, Ariz., on one of the reclamation projects, and after three years of selection we have grown some Egyptian cotton there in a commercial way that is equal to any of the imported article. Trial shipments of that cotton have been made, and found by manufacturers to be fully as valuable as the imported kinds. Now we have at Yuma about 100,000 acres available for cotton culture, and we are going to make a special effort to grow all our Egyptian cotton right there, and in eight or ten years we will be doing it. There are a great many acres more there which are also available for other work.

The CHAIRMAN. Do you expect to return to the cotton question again in discussing your pathological work?

Mr. GALLOWAY. No; I had not contemplated doing so.

The CHAIRMAN. If not, I would like to direct attention at this time to one of your projects, for the investigation of cotton wilt. This is on page 20 of your typewritten book, where I see you have an estimate of \$4,000 for investigating the cotton wilt and other cotton diseases, and as a result you speak of the fact that a number of varieties of sea-island cotton were developed successfully two years ago, and I wondered if you were still continuing any work on that line?

Mr. GALLOWAY. We are continuing that work on the sea-island cotton in the Southern States where the sea-island cotton is just being introduced, and where they have some diseases that are different from the disease of the ordinary sea-island cotton up on the Carolina coast.

The CHAIRMAN. Turn to page 21 of your book, where you speak of the control of Texas root rot of cotton. Can anything more be done on that line or have you finished your work?

Mr. GALLOWAY. The cotton root rot investigations have not been entirely satisfactory, for the reason that it is one of the most difficult of diseases to handle, and we still believe that a certain amount of work ought to be done in the direction of interesting farmers in the matter of rotation, and early and deep fall plowing, for the eradication of this disease, and the purpose of this work for the next year will be mainly along that line and it will be mainly for

demonstration. The laboratory investigations have been carried about as far as they will be carried, have they not, Mr. Woods?

Mr. WOODS. Yes, sir.

The CHAIRMAN. And it is a matter now of field work?

Mr. WOODS. In commencing on the wilt, the trouble was that after we got the thing worked out, the sea-island growers formed a combination and would not let an ounce of that seed get out, so that we now have to develop strains for Georgia and Florida.

Mr. GALLOWAY. We have not been able to get any of the seed, and they will not sell any to go out of there.

Mr. HEFLIN. Do you grow any in South Carolina, Florida, and Georgia?

Mr. GALLOWAY. No, sir.

Mr. WOODS. The reason for this was that there was an attempt made by a foreign Government to get some of that seed for the West Indies, and they were a little afraid that if it got into the West Indies there might be too much sea-island cotton on the market. As to the upland wilt, the other thing referred to there, we have now a wilt-resistant strain of upland cotton. It is wilt resistant, and heavy yielding. It yields about a bale and a half to the acre under good culture, but the fiber needs improving a little. It is short staple, and a trifle weak, but that can be improved.

Mr. POLLARD. I would like to ask about this improved strain of sea-island cotton, this wilt-resistant species you have developed. Was that introduced by you to this particular section where this combination was formed? Did the Department here develop that strain and give it to the people down there?

Mr. WOODS. Yes, sir; developed several strains and the sea-island growers also developed some.

Mr. POLLARD. And then they formed a trust, a combination, and prevented your taking the species that you had developed yourselves and giving other sections the benefit of it?

Mr. GALLOWAY. It is hardly that, is it, Mr. Woods?

Mr. WOODS. It is not quite so bad as that. We have 200 pounds of the seed. But there was a general movement started in the West Indies, when we had trouble in our cotton markets here, to produce sea-island cotton in some of the West India islands, and they were trying to buy the seed through various people, and these men simply agreed among themselves that they would not let that seed go out of there.

Mr. POLLARD. Go out of where—out of the United States?

Mr. WOODS. Out of the sea-island district in South Carolina.

Mr. POLLARD. Did you develop this strain?

Mr. GALLOWAY. We were not alone in it. Just as soon as we began our selection the planters there began to work also. Those planters there are thoroughly organized, and they are the most intelligent growers probably in the United States.

Mr. POLLARD. In what State is that?

Mr. GALLOWAY. South Carolina. I mean by that that these gentlemen have been for years, and had been for years, growing this cotton, and they have reduced its growing to a science. They were rigid in their methods of selection. They had cast-iron regulations as to the proximity of stray cotton, so that there should be no cross fertiliza-

tion, and it was an iron-bound, rock-ribbed affair. Just as soon as we began our selections, a number of those gentlemen who were intelligent enough to take it up and go on with it did the same thing we were doing. We were not alone in the development of these strains. They had them as soon as we had them.

Mr. COCKS. They were following your work?

Mr. GALLOWAY. Yes, sir; I presume if we made a real point of it that they would not refuse to let us have the seed. We have gotten our seed, and we have gotten our start with the seed. But we would not want to be put in a position of refusing to furnish that seed to some foreign Government, and we would have had either to furnish or refuse to furnish it if these gentlemen had not refused to let it go out, because we are called upon every day for seed by some foreign Government. We would not have wanted to be put in the position of refusing it, since we never know when we are going to want seed ourselves, of various kinds. The next group of work has to do with the studies of tobacco and tobacco improvement.

Mr. GILHAMS. You were talking about alfalfa, and the different strains, and some varieties being much hardier than others. I know our people in our country have been for several years trying to raise alfalfa, and they have not been successful, and I wanted to know whether you knew of varieties that you thought would grow in northern Indiana, Illinois, and southern Michigan and Ohio?

Mr. GALLOWAY. I do not think there is any question about the matter of hardiness. It is largely a question of adaptation there of soils and proper conditions to grow the crops. Any ordinary alfalfa would be hardy enough for that region if you could succeed in getting it started. The question of getting alfalfa started is a different question from that of hardiness. It is a question of having the soil properly inoculated, and that is a line of work we are engaged upon and which we will discuss later on; or I can bring it out now, if you would prefer it. The question is to get alfalfa to grow, where it has hitherto refused to grow, through an inoculation of the soil. The alfalfa, like a number of similar plants, like all the legumes, must have certain organisms in the soil before it will grow. These are what help the plants to grow, and unless they are either in the soil naturally or are put there artificially, the plant refuses to grow, and one of the questions in all that section you mentioned is primarily that of getting the proper inoculation, and if a farmer starts in and works persistently in a small way at first, and taking an acre or two and getting that acre or two properly inoculated, I believe in all that section he could succeed, and alfalfa would be extended over that country provided, of course, soils and other conditions are favorable. That has been the experience in other cases.

Mr. GILHAMS. I have in mind a man who lives near the place where I live, who has had a field in alfalfa for about four years, and it has been under my observation and I have been watching it closely. He has been able to cut it as high as three times in a season, but last year it died out for him, and he has plowed up the ground. It has always turned somewhat yellow. Now, why did it die?

Mr. GALLOWAY. It may have died from weed suffocation, not being able to withstand the onslaught of the weeds. That is one of the difficulties. Or it may be that the soil needed a fresh application of lime. Lime is necessary for the production of alfalfa. You must have a neu-

tral soil. If your soil is acid, the chances are that your alfalfa will not succeed. If that was my alfalfa, I think I would plow it up, or resow it, and go on, and probably it would be successful, because your constituent has already got the inoculation there.

Mr. GILHAMS. Last season at this point was an unusually wet season, probably three times the amount of water falling during the season than there has been in any other season in a dozen or twenty years. Would that have any effect to kill off the alfalfa?

Mr. GALLOWAY. It would if the field was flat and the drainage poor, so that the roots were submerged. That would be one of the quickest ways of killing the alfalfa. Alfalfa must have good root drainage. That is one of the mistakes the Eastern farmers have made often in starting out with alfalfa; they have selected a low piece of land because the land was richer there, and on that land it is only a short distance down to water and the plant goes down that far and stops.

Mr. GILHAMS. On this land it would be 20 to 25 feet to water and then a gravelly clay.

Mr. GALLOWAY. In that case I do not believe the water would have produced that result.

The CHAIRMAN. Is it not true that one great difficulty in producing alfalfa in humid regions is the trouble of curing it?

Mr. GALLOWAY. Yes.

The CHAIRMAN. I have noticed in eastern Kansas that that is the trouble more than anything else. There is no difficulty in raising a crop, it grows luxuriantly, but at the time it ripens we are having showers every day, and sometimes two or three times a day, and there is not time enough between showers for the alfalfa to cure, and I doubt whether it would ever be a profitable crop in humid regions for that reason.

Mr. GALLOWAY. One of the curious things about alfalfa is that, aside from the irrigated regions, it makes its best growth in humid regions like southern Louisiana. The matter of curing it has received the attention of the Department, and experiments have been made in curing it artificially, as we dry hops, and some results have been secured that are encouraging. It may be that the crop can be cut, and within fifteen or twenty minutes cured—dried out. We have done that. There remains now the question of doing it on a profitable basis. Of course such a crop is much more nutritious and much more highly colored when cured in that way than any that is sun cured. Alfalfa dried in fifteen minutes is practically as green as the day when it was cut, and it has lost none of its nutritive qualities. We have dried it in the same kind of an apparatus that is used for drying hops. One of the main problems we are working on is to devise some kind of an itinerant arrangement like a thrashing machine, to go from farm to farm and dry the alfalfa.

Mr. HAWLEY. How much does it cost to cure it? •

Mr. GALLOWAY. We have got it down to about \$1 or 90 cents a ton.

Mr. COCKS. Is that same kind of inoculation good for alfalfa that is good for red clover?

Mr. GALLOWAY. No, sir; it is a different organism.

Mr. COCKS. Then I am to understand that the inoculation that produces red clover would not be good for alfalfa?

Mr. GALLOWAY. No; you would not use the same thing for different kinds of legumes. For instance, you would not use the same kind for the cowpea and the soy bean. You must be conservative on that matter, because there are indications that there are different strains of these things that produce different results on different soils.

Mr. COCKS. I have planted alfalfa on my place, and I can not get any inoculation from organisms at all.

Mr. GALLOWAY. It is worth all the trouble any one wants to give it to raise alfalfa. As a test I put out a rather poor piece of land here—1 acre—and I cut 4 tons of alfalfa the first season.

Mr. HEFLIN. What does it bring a ton?

Mr. GALLOWAY. Twenty-two to twenty-five dollars a ton, here.

Mr. HEFLIN. Would you not think, after raising alfalfa three or four years, there ought to be enough of these organisms in the soil to raise good crops?

Mr. GALLOWAY. Yes, unless there were very peculiar conditions there that would destroy these organisms; and then you would have to neutralize your soil by lime.

Mr. GILHAMS. How much would you advise putting on this land; is it a light, gravelly soil?

Mr. GALLOWAY. We would have to test the soil and see how much it would be necessary to put on to neutralize it; but ordinarily we do not put on much, about 1 ton of the ordinary lump lime.

Mr. GILHAMS. To the acre?

Mr. GALLOWAY. Yes.

Mr. COOK. Would not the climatic influences in the States of New York, Ohio, Indiana, Illinois and Michigan, have something to do with getting the first stand for alfalfa?

Mr. GALLOWAY. Yes; that is a material point. In certain of those States you would not be successful in getting a stand by ordinary growing in the spring, because of the climatic conditions and the fight with weeds.

Mr. COOK. You say the precipitation was three or four times as great last year as ever before?

Mr. GILHAMS. Yes.

Mr. COOK. Would not the precipitation have caused the alfalfa to assume a yellow appearance?

Mr. GALLOWAY. That might have been the case, and undoubtedly the precipitation and humidity caused the weeds to grow, and the alfalfa in the East is a poor weed fighter. Crab grass is one of the obstructions to alfalfa in the East, and that grows in all the fields in August, and the alfalfa is practically suffocated, and when you go to look for it in the fall you can not find it; it is gone.

Mr. COOK. You spoke of liming the soil.

Mr. GALLOWAY. Yes.

Mr. COOK. Two years ago a farmer visited me, a friend of mine who has a large farm in Indiana. I induced him to take 25 pounds of alfalfa seed and plant it on his farm. His entire acreage is underlain by limestone; it is a limestone country down in southern Indiana. He was unable to get a stand. I asked him to put a part of his seed on land that was tiled, and a part on land that was not tiled, and he was unable to get a stand on either kind of land. How do you account for that?

Mr. POLLARD. Is it not possibly due to the method of cultivation and preparation of the soil and the sowing of the seed?

Mr. GALLOWAY. All those conditions have to be considered. The physician, if he is a wise one, will be careful about his diagnosis.

Mr. HAWLEY. Can these organisms be artificially supplied?

Mr. GALLOWAY. Yes sir; we are sending out many packages now. We not only multiply them, but we have bred them, so that they are more active and virulent. The ordinary organisms are not very active, but after running through a laboratory course they are very strenuous and those are the ones we distribute.

Mr. HAWLEY. Out in my country, in Oregon, alfalfa gives 3 good crops, the first crop good, the second fair, and the third not so good as the first, and then it dies out.

Mr. GALLOWAY. If we could do that in the East we would think that we had the problem solved. We are satisfied to have an alfalfa crop here that only stays two years, because it is a money crop at that.

Mr. HEFLIN. If you could succeed in growing alfalfa how much would it produce?

Mr. GALLOWAY. Three and a half to 4 tons in the East, and in the West anywhere from 5 to 12 tons.

Mr. HAWLEY. We only get about one-third as much there as you do here for forage crops.

Mr. COOK. We average 3 cuttings in Colorado, with a total yield of about 4 tons to the acre.

The CHAIRMAN. How much a ton is it worth?

Mr. GALLOWAY. It is worth about \$8, now in Colorado. The price for several years has averaged about \$6. It requires no cultivation after it is once planted. All it needs is a little water.

Mr. POLLARD. Have you found in growing alfalfa that when the water reaches the roots the plant will die?

Mr. GALLOWAY. Yes; it makes practically all of its new growth at the tip of the roots, and when the water reaches the roots the plant may cease to grow.

The CHAIRMAN. Then you have to plow it up?

Mr. GALLOWAY. Plow it up, or sow it again, or put in some other crop for a year or two. Out in Colorado they grow potatoes in rotation with alfalfa, and it is a valuable crop to enrich the land for potatoes.

The CHAIRMAN. I would like a little more information about the machines which you use for curing alfalfa.

Mr. GALLOWAY. The experiments made so far have been with machinery that is used for other purposes, such as the curing of hops, or the evaporation of fruit, being made primarily with the idea of getting some definite figures on the cost of taking the water from the plant. After getting those figures we want to devise some simple apparatus that a farmer, or a group of farmers, may use for the purpose. But the question is whether we can take the water we find in alfalfa out, and reduce it to a hay crop, and that question seems answered. We have been able to do that with the machinery we now have, at a cost of from 80 cents to \$1 a ton.

Mr. HAWLEY. What temperature do you use in that process?

Mr. GALLOWAY. Two hundred and eighty to three hundred degrees, I believe. Soft coal was used in one place and wood in another. The question of fuel of course would enter into it.

The next group of projects or problems has for its object the study of tobacco, and I will ask Mr. Woods to present that.

Mr. Woods. The tobacco work includes several lines of investigation. The first, laboratory, which has to do with the determination of the quality of the types of tobacco selected by the men in the field, and in this work we have developed special apparatus for testing burn, and it enables us to take a leaf that has been selected and cured and fermented, and determine whether it has the fine burning qualities for cigar tobacco.

Another line is connected with the curing of tobacco. After the leaf is cut, the starch and sugar and other things which the leaf contains have to go through a process of fermentation in the leaf. The starch is changed into sugar, and the sugar is changed into products which give the flavor and aroma to the leaf. If that curing takes place in too cold a temperature, bacteria get in and produce what is called pole burn. The laboratory men have been investigating that, and find that it is due to the fact that after the starch is converted into sugar, the moisture in the air makes that a good feeding ground for bacteria and fungi, so that the remedy is to raise the temperature and keep a better temperature in the curing sheds, and there is no more pole burn. We find these changes take place best if the room is dark. If there is light in the room, the leaf goes on forming starch, and that is liable to result in forming green spots in the leaf.

The CHAIRMAN. I notice you are carrying on experiments in the curing of tobacco in practically all of the tobacco States. Do you do that because you think that it is essential to the experiment to have the work done where the tobacco is raised, or could it be done satisfactorily in a central laboratory here?

Mr. Woods. Our curing work in the States is only a very small matter. We cure only our experimental bulk, and we send some of it on here for further investigation. The principal curing work up to the present year has been conducted by the Bureau of Soils, and we have practically closed that work, because they have shown how the bulk fermentation method can be carried on, and there is very little more for us to do on that line; so that hereafter our work will be devoted more to breeding and selection and improvement of types, and only the curing of the types we are studying will be done, as far as may be necessary, in the field in order to preserve them and ship them for further investigation.

The CHAIRMAN. I am glad to learn that, because it looked to me as though it was an unnecessary expense to have it done there.

Mr. Woods. Practically all the tobacco men now know the methods, and it will not be necessary to continue to any extent the questions of fermentation and curing, beyond the scientific investigations and necessary little problems that come up from time to time.

Mr. GALLOWAY. I might add that it seemed unwise for the Department and the Government to continue in the capacity of sponsor for private firms and parties in the matter of handling and curing the crop. Therefore we have determined as our future policy that we will pursue the scientific investigations and give the farmers the im-

proved types, as far as possible, and then let the individuals go ahead with the work, and not stand behind them and help them grow their crops and sell them; but we will furnish them with the methods and the material, and then as far as we are able the seed, and let them do the rest. That is the policy we are going to follow.

The CHAIRMAN. I am glad to hear that is your policy. I am sure it will meet with the entire and enthusiastic approval of this committee.

I would like also to inquire Doctor Woods in regard to another matter. I notice that you ask for an increase of about \$5,000 in your tobacco work this year. Most of these increases are asked for in about this language, "The increase of \$1,000 is desired for normal growth and extension of the Virginia work, which is now being conducted," and so forth. In another place you ask for money for the normal growth and extension of the Florida work. In looking over your projects, it seems as if you were carrying on the work pretty extensively in those places now, and I wondered whether any part of the additional money you ask for would be used to demonstrate the facts which you think you have already shown, or to disseminate information which you have already acquired, and what portion of it would be used in continuing the investigations.

Mr. WOOD. Both of those would be involved. We have worked out methods and are demonstrating in all of those States. In the first place, we showed that it was necessary, in order to secure uniformity of type, to save the seed, to bag selected flowers, which showed after careful examination all the qualities desired. The method of saving the seed under bags is now generally used in Connecticut and the States where we have been working for two years. Most of the growers have adopted it, so that we are not doing much more along that line, except teaching people how to do it, to do this work of saving the seed under bags, and how to select the best shaped leaf and the leaf that shows the best indications of curing down into a good burning leaf, or a good wrapping leaf, or the best filler. Selections are being made along that line. Then there is the seed separating machine, which is just a little air blast, worked by a foot pump, which we introduced three years ago in the Connecticut work. We are introducing that in the various States as fast as possible. That blows out the lighter seeds, and increases the uniformity and the disease-resisting power of the plants very greatly. It is an inexpensive machine and an effective method of clearing out the lighter seeds and keeping the heavier seeds. That makes a difference of 15 per cent in the yield of the crops, simply to blow out that light seed. Those two elements are the principal points that the growers need to learn in the various States, how to select their plants, how to select the seeds, and how to separate the light seeds from the heavy seeds.

In Connecticut we are continuing some investigation on breeding special types for higher yield and for general quality, and especially for disease resistance, and to get types which will not sucker. We find that the suckering of the types is an inherited quality, and that all the expense of suckering can be obviated by selection of types that do not sucker. The method of curing, and the method of putting the heat into these curing sheds, will be the only work we will do up there this year.

In Florida we have 2 varieties—the Uncle Sam Sumatra and the Hazlewood Cuban—both of which are very fine tobaccos, the Uncle Sam Sumatra being practically equal to the imported Sumatra leaf, giving perfectly uniform yields in Florida as well as in Connecticut. The Hazlewood Cuban is as good as, and a much better producer than any of the imported Cuban types.

The CHAIRMAN. You propose to add \$1,000 to this year's allowance for increasing the work in Florida. How would you spend that money?

Mr. WOODS. The tobacco industry in Florida has expanded very rapidly, too rapidly for the good of the industry, and many growers, especially in the northern counties, in Leon County and adjoining counties, have gone into the question of growing shade tobacco. They have considerable shade put up, and their soil type is somewhat different from the soil type best adapted to Sumatra tobacco. That work was started by the Bureau of Soils, and we must go in there now and help those people to secure types that will give them good results on that land. They have made their investments, and we must stay by them until they can get types that will do well on their lands, which are a little heavier and not so well adapted to Sumatra or Cuban shade tobaccos. After we have found the type to modify, so that it will do well on those soils we can stop.

The CHAIRMAN. Do you think it would be necessary to add \$1,000 to your last year's allotment for that work?

Mr. WOODS. If we do all the work that has been demanded of us, it will be necessary. We have only a comparatively small amount of money in Florida now, and we need another man there.

Mr. GALLOWAY. Answering your question probably more specifically than Mr. Woods has, I would say that in the past year, ever since this work was turned over to the Bureau of Plant Industry, we have been beset for an extension of this supervisory work, and we have been constantly trying to keep that in the background, keeping to the front the fact that what we want to do is to reach the individual in the matter of teaching him better methods in the manner of handling his crop, better methods of saving his seed, and using strains or types that would give him better returns. At the time when the submittal of estimates from our various officers was requested, our office of tobacco investigations submitted an increase of \$27,500, and it was a question between myself and the Secretary for some time whether we should ask for any increase or not; but with a view of meeting these various requests for expansion in various States, more particularly from Ohio, New York, Kentucky, and some parts of Florida, we thought it would be well to add \$5,000 and divide the sum up between the various projects, so that we could expand the breeding work, and the general cultural work, rather than the supervisory work. That is the way it has turned out.

The CHAIRMAN. The idea I had in my mind was this, that it was a waste of money to go ahead with researches which brought to the men in charge information, but which they would not have funds to carry out to the people. Do you get my idea? You have already been doing a great amount of investigating here, and what I wanted to find out was whether you intended to keep on doing more investigating, or to carry to the people the knowledge that you now have.

Mr. GALLOWAY. That is the main object of the work, to carry to the people the knowledge we now have, and to reach them by direct cooperative effort rather than simply to select a group of men and stand behind them and grow the crop for them.

The CHAIRMAN. Do you get any help at all from the agricultural colleges in these various States?

Mr. GALLOWAY. Yes; in 3 of them we do, material help. Kentucky is cooperating with us, and we have an arrangement with the Kentucky experiment station whereby we pay the salary of 1 of their best tobacco men; and they furnish about half of the expenses in the way of materials and laboratory facilities for whatever must be done out there in the Kentucky and Tennessee tobacco regions; and in Ohio we have a similar arrangement with the Ohio station, only we have the expert there on tobacco, that is, the pathologist and botanist of the station, and we only pay him a minor salary, simply as collaborator. The expenses we are involved in there have to do with the field work and other lines of investigation. In Connecticut we cooperate with the Connecticut station.

The CHAIRMAN. Are you not spending more money in Florida than in any other State, and do you get help from Florida?

Mr. GALLOWAY. No, sir.

The CHAIRMAN. Is the State agricultural college doing anything to help the tobacco experiments in that State?

Mr. GALLOWAY. I do not believe they are working on tobacco at all.

The CHAIRMAN. Speaking generally of the work of your Bureau, I have been impressed often with the observations that you have made about the appeals that have come to you from all over the country for help for this thing and that thing and the other thing. It seems incredible that no one at the State agricultural colleges and experiment stations should be doing work along this line, and I have wondered whether you ever referred any of those appeals to the state institutions.

Mr. GALLOWAY. Yes; we do that quite often. We do it wherever it is practicable to do it, and where the State is in a better position to give the information than we are.

The CHAIRMAN. You do admit that there are certain places where the State is in a better position to do the work than the Department of Agriculture is?

Mr. GALLOWAY. Certain local work, yes, sir. I do not say it with any spirit of criticism at all, but so far as this work on plant industrial lines is concerned, the national Department is far and away ahead, necessarily, of the States, because the stations have not as effective an organization as the Department. We have so specialized, we have been able to pick the best men from the stations and put them in the very things they have been always working on, and give them conditions here that they could not find anywhere else, and give them opportunities for forming a broad point of view that they could not form in any other way, that we are looked to by the stations for that sort of information.

The CHAIRMAN. I brought your attention to this matter because it seemed to me that if the Department is going to absorb all of this

work through the country, the very purpose of the establishment of the State institutions would be very largely nullified.

Mr. GALLOWAY. I do not think there is any chance of the Department absorbing the work of the stations. In fact, the work of the stations, if you come to question them, you will find is growing apace, about as rapidly as our work, and they have about as much to do to take care of the interests within the States, as they look upon it, as we have, but the question of proper relationships, and the methods of bringing about those relationships between the Department and the stations are of course important problems, and we are working them out. It is just a question of working them out. It is not a question that can be settled by any arbitrary rules or by law. We have simply got to understand each other and get together and conduct the work harmoniously, to the end of benefiting all the people for whom the work is intended, namely, the farmers; and there is after all very little duplication of the Department's work and the experiment station work. In the matter of handling fertilizers, fertilizer control, animal husbandry, and animal feeding, and all that sort of work, the stations are of course doing a great deal more than the Department is doing, because the Department has not the facilities, and it has never attempted to go into that field extensively. The Bureau of Plant Industry probably comes into closer contact with varied lines of station work than any other Bureau, and for that reason we are constantly working to bring about further understandings between the station people and ourselves. We have cooperative arrangements with practically every station, in one form or another, and we have appeals from the stations to cooperate with them and take up certain lines of work with them. We are just now considering a proposition emanating from the Iowa station to take up the question of breeding fruits for the entire Northwest country, and we have decided that it would not be wise to take up that work with any one station, but to act as a sort of collaborator with all, and take up with all of them the question of the development of fruits for the Northwest.

Mr. POLLARD. I would like to inquire what you would think of the practicability of the idea of the Government confining its cooperative work to those States that are willing to assist, instead of your carrying on the work, as you do now, regardless of whether the State takes any interest in it or not, or is willing to cooperate in any way whatever. I understand you to say that in Florida, where you are doing most of your work on tobacco, there has been absolutely no cooperation at all.

Mr. GALLOWAY. The feeling there is perfectly harmonious, but the State is perfectly passive.

Mr. POLLARD. They are willing for you to do all the work. Now, why would it not be better for you to expend your energies and the Government's money in some State where they are willing to cooperate with you and bear their portion of the expense?

Mr. GALLOWAY. That is practically the stand that some States take; but what would you do in a case where it is not a question of cooperation, but it is simply a question between the station and the

Department as to whether the Department should come to the State at all.

Mr. POLLARD. I did not understand your question.

Mr. GALLOWAY. What would you do where the State preferred to do its own work?

Mr. POLLARD. If they want to do the work I do not see why we should object to it.

Mr. HEFLIN. Do you know whether or not any effort has been made by anybody in Florida to get the State to cooperate with the General Government in this work?

Mr. GALLOWAY. The State experiment station of Florida is in charge of a director who was for a good many years a member of the staff of the Bureau of Plant Industry, Prof. P. H. Rolfs. He has been so overworked with other things that are more vital to the people of the section where the station is located, that is with reference to fruits, that he has concentrated his funds on that work. It is a question of funds from the State to help him carry on his work.

Mr. HEFLIN. Has the State said anything about it; has any step been taken by the State at any time?

Mr. GALLOWAY. No sir; we are cooperating with Professor Rolfs in a number of other fields.

Mr. WOODS. They have not anyone at the station who has specialized on tobacco.

Doctor GALLOWAY. They have not anyone at the station who has worked with this crop.

Mr. BEALL. Just in this particular instance there is no cooperation with you because they are devoting their energies to something else?

Mr. GALLOWAY. In other ways they are cooperating with us.

Mr. BEALL. What has been the result of the experiments in Texas at Nacogdoches?

Mr. GALLOWAY. They have been very successful. We had this year about 250 acres of Habana filler grown there, a tobacco that is still open to some improvement; but it is a tobacco that has sold well, and our plan is to go there and continue the breeding and developing work, to the end of fixing that type just as we have done with the wrapper type up in Connecticut.

Mr. BEALL. Does the tobacco produced there compare favorably with the Cuban tobacco?

Mr. GALLOWAY. It seems to. Some who have tested it say otherwise, but a good many say that it compares very favorably with the Cuban tobacco. There is still room for improvement.

Mr. WOODS. That is the filler tobacco. The wrapper tobacco that is grown there this year is not very good. The filler tobacco is very fine in quality, equal to almost any that has ever been produced.

Mr. BEALL. Is there a considerable area down there that would be suitable for such production?

Mr. WOODS. It is very large.

(At 12 o'clock m., the committee adjourned until Monday, January 20, 1908, at 10 o'clock a. m.)

MONDAY, January 20, 1908.

The committee met at 10 o'clock a. m., Hon. Charles F. Scott (chairman) in the chair.

STATEMENT OF MR. BEVERLY T. GALLOWAY—Continued.

The CHAIRMAN. Gentlemen, we will resume the hearing on the appropriation bill where we were interrupted by the adjournment last Friday, and I will ask Doctor Galloway to continue.

Mr. GALLOWAY. When you adjourned on Friday we were discussing the tobacco work, and had about finished that line of projects. I might briefly review the tobacco investigations as they stand. Aside from the fact that we are conducting tobacco work in cooperation with the State experiment stations in Kentucky, Ohio, Maryland, and Connecticut, we are also conducting tobacco investigations in New York State, in Pennsylvania, and in Virginia (also in cooperation with the station), in Florida and in Alabama. The primary object of the work, as was stated at the last hearing, is to improve the cultural methods and to work out systems of breeding so that the tobacco growers will have types that will meet the requirements of the soils and the climates where we have found that the best tobaccos can be developed. I do not know that it is necessary to go any further into the tobacco work, unless there are some questions.

The CHAIRMAN. Before you leave that, I would like to ask a question. I have the book of your projects, and I notice under the head of "Tobacco investigations in Florida" you estimate an increase of \$1,000 during the coming year for the extension of the work in Florida and Georgia, and the further improvement of varieties, and the cultural methods. The question I wish to ask is why you could not carry on the work with the same amount of money that you had last year.

Mr. GALLOWAY. We have certain projects under way in Florida that are not yet completed, and we want to continue or extend the same kind of projects into other regions where work has been started but where it is not yet definitely determined that these hybrid tobaccos can be grown. That is the main object of this addition of \$1,000.

The CHAIRMAN. Is it not better to complete one project in one place? Until you develop the fact that certain hybrids can grow in Florida, for instance, what is the use of trying those hybrids in some other place. Is it not better, while you are trying to develop hybrids, to continue to work in one place until you have found something that is of some value before going on and expanding experiments in other places?

Mr. GALLOWAY. It is not so much the growing of the hybrids as it is the extension of the work of growing hybrids we have been growing elsewhere into the areas where work with other types has been started. In Florida we have introduced the hybrids principally that we have been developing in Connecticut. It is a continual evolution, so that a hybrid that may be better this year may not be best next year, and we are constantly endeavoring to improve in the direction where improvements are required.

The CHAIRMAN. Yes; but the question in my mind is why it should cost more to conduct those experiments one year than another year.

It is a matter of time, anyhow. You have to try a hybrid three or four years before you can find out whether it is developing true to type or not, and why can not the experiment proceed with entirely satisfactory results within the same limits in which it has been going on?

Mr. GALLOWAY. In certain parts of Florida there are yet undetermined questions as to whether these tobaccos can be grown successfully. The farmers most interested in tobacco growing are anxious to make an experiment as to whether tobacco can be grown with success there. We can pay no attention to the requests to go on with the extension of the work in Florida. It is simply a question of extending the culture of these tobaccos.

The CHAIRMAN. Are you extending into new territory things that you already know, or are you simply extending your experiments?

Mr. GALLOWAY. We are extending experiments. This soil has been mapped by the Bureau of Soils, and it has been in a measure determined by that Bureau; that is, it has been in a measure determined by that Bureau that these types will grow there, but we do not definitely know that they will grow.

Mr. Woods. The situation is this, the Bureau of Soils started the work there before we took it up, and there is a lot of tobacco planted in the northern counties of Florida, particularly in Leon County, and also in southern Georgia, that was really supervised by the Department under the Bureau of Soils. Selected seed was not used, and the crop they have obtained this year is very poor tobacco. Lots of it can not be sold. Now, they have about 300 acres of shade, and what we must do is to get for them types that will grow under that shade. They have their investment there, and they made it under the Department's supervision, and we must stand by them until we get a type of tobacco that they can succeed with. It is not really an extension of the territory.

The CHAIRMAN. What you say illustrates what I had in my mind, that is, that there is danger in going too fast. I do not think that the Department was warranted in extending encouragement to men to go to large expense, to make a great investment, in a matter which they were not satisfied by actual demonstration was going to be a success. Evidently, from what you have said, by reason of the encouragement of the Department men have made a large investment, they have put up shade over 300 acres, and they have not gotten good results. Do they not blame the Department for it?

Mr. Woods. It was not due to the Department stirring up the matter. Such fine success was obtained in the Quincy tobacco area that people all around there insisted upon putting up shade, and although Professor Whitney's men did all they could to get them to put up small areas of shade, the people insisted upon having some assistance and direction, and the Bureau of Soils assigned an expert to that territory. This year since the work has been assigned to our Bureau we are doing the best we can to help those already in the business and discourage extension. The same thing is going on in Texas, the growers are insisting upon putting up a large amount of shade and we are advising them not to do it. One man in Texas wants to put up 15 acres of shade, and the trouble is that the tobacco buyers offer him a good price for his tobacco if he can raise it. The people think they can raise it, and say, "You show us how to raise it: you help us out."

We tell them that we have not the seed and are not able to do it, that the weather conditions are not favorable in Texas for wrapper tobacco. The Department is not really responsible for the Texas situation, and it is not really responsible for the expansion in Florida. Perhaps we made a mistake in yielding to the demand for assistance and giving the growers such assistance as we could. The soils looked all right, and probably they are all right if they have the proper varieties of seed.

Mr. GALLOWAY. And keep them true to type.

Mr. WOODS. As Doctor Galloway explained, we have not gone beyond the area that we have inherited from the Bureau of Soils, and we are trying to round it up and bring the work into a satisfactory condition. That is all we are trying to do.

Mr. McLAUGHLIN. I understood from your first statement, you said you were bound to see this thing through, and you were under some obligation, and now I understand that you are not under any obligation.

Mr. WOODS. We are not under any legal obligation. We can help them out if we can get the seed with which they can succeed. They are not farmers, many of them, but lawyers and business men who know nothing about tobacco have gone into the growing of tobacco on their own responsibility, and a great many of those people are dropping out. They do not know how to grow a good type of tobacco.

The CHAIRMAN. I am glad to hear Doctor Woods say that he does not believe that the Department can be held responsible for this. I think I can understand how men put perhaps too enthusiastic an interpretation upon statements that they might see, perhaps, in newspapers or farmers' bulletins; but this simply calls the attention of the committee to a point that I have had a good deal of anxiety about in a good many cases, the fear that through premature publication, claiming results that as a matter of fact had not been fully determined, the Department might lead men to make investments which might turn out badly, and in that way bring discredit upon the Department itself. I think that is a matter that should be most carefully guarded against.

Mr. RUCKER. As a matter of fact, though, this tobacco work is nothing but experiment. You have demonstrated a type which you can grow successfully under shade?

Mr. GALLOWAY. In certain regions, with certain tobaccos, that is demonstrated beyond all question. But the chairman has, I think, well made the point that the Department can not be too careful of its statements. In other words, I think the chairman once made a statement which I can well repeat, that is that the Department of Agriculture should be looked upon as the court of last resort, and its statement should be final upon all matters of culture and advice to the people. If there is any doubt whatever as to the advisability of recommending a thing, we should hold in reserve that thing until we are absolutely sure of it. That seems to be the usual and general policy. At the same time there is a large and influential element in this country in the shape of magazine writers and newspaper men who will not be content with conservative statements. They take the conservative statements of the Department and make very different statements out of them. That is very well illustrated in all

matters coming up in relation to new crops. We get a new thing in limited quantity and perhaps make a very cautious statement about it in our publications, and announcement is then made throughout the country by newspaper correspondents that the Department has found a remarkably good thing and one that will grow all over the United States and can be successfully handled by farmers generally, and we are besieged with requests for it.

Mr. LEVER. But the Department ought not to be held responsible for the interpretation put upon your statement.

Mr. GALLOWAY. No; but it is sometimes held responsible.

The CHAIRMAN. Under the head of your "Texas investigations" I notice you ask for an increase of \$1,000 for the reorganization and extension of the Texas work on the basis of the improvement of varieties and farm methods.

Mr. GALLOWAY. Yes.

The CHAIRMAN. Why is it necessary to reorganize?

Mr. GALLOWAY. It is necessary to reorganize because we shall change the policy with reference to the handling of the crop there, since the work has come over to us. Instead of merely acting as sponsors for the growers, we intend to go in there and point the way by means of the establishment of types by breeding and selection, and we will have to effect a complete change in the work, and probably a change in the men to do the work.

The CHAIRMAN. When did you take over this work?

Mr. GALLOWAY. This year.

The CHAIRMAN. This current year?

Mr. GALLOWAY. Yes; we let the work go on as it was, because, as we took it over the 1st of July, we had to let it continue along the same lines. We had to close up the season's work. The Bureau of Soils is now doing no tobacco work.

The CHAIRMAN. I have no further questions on this subject.

Mr. WEEKS. If you change the men, what will you do with the men you have employed there?

Mr. GALLOWAY. Most of them have resigned and gone into business.

Mr. WEEKS. Suppose they did not resign; are they under the civil service?

Mr. GALLOWAY. No, sir; these men, who were engaged in supervisory work, looking after the growth of tobacco and guiding the farmers in their methods of handling and curing the crop, have nearly all resigned. How many of them have resigned Mr. Woods?

Mr. WOODS. About 5 or 6.

Mr. WEEKS. Nearly all of them were special experts engaged by the service?

Mr. WOODS. Yes; we have kept a few in Texas who can go on with this work.

The CHAIRMAN. One other question. Under the head of your "Tobacco investigations in Alabama," you say that the market for this tobacco has not been established as yet, and it is necessary to assist the growers in finding a market for their crop. Why is there not a market for the tobacco crop in Alabama?

Mr. GALLOWAY. The tobacco in Alabama has not been perfected yet, and I do not know that we shall follow that project at all. Mr. Chairman, these project statements that we gave you were hurriedly

prepared from the original projects by one of our clerks, and I do not know that we shall follow them at all. We are not especially interested in helping people to find a market for their tobacco.

The CHAIRMAN. If there was no market for it, it would not be worth while going on with it.

Mr. GALLOWAY. If we develop the types and point the way for individuals, that is all we should do. It does not seem to me it should be the function of the Department to go on and assist the tobacco raiser and grower to find the market and sell it, but the grower can be taught how to find the tobacco that will meet the conditions that the market requires.

Mr. POLLARD. This work you have been doing in Florida and that which you contemplate doing in Texas is not in the nature of demonstration work, in the way of showing farmers there how to grow tobacco; and your work is confined to the payment of a salary and the expenses of an expert?

Mr. GALLOWAY. Yes, sir.

Mr. POLLARD. You do not plant any tobacco yourselves?

Mr. GALLOWAY. No; except in the strictly experimental work.

Mr. POLLARD. Or pay any of the expense of common labor or anything of that kind?

Mr. GALLOWAY. No, sir; our expense is practically for the experts engaged in the work, and for securing high grades of seed, and the expenses connected with the experimental investigations we are conducting. That is as far as demonstration is concerned it is hardly to be considered in that category yet, some of the work is fundamentally experimental and the demonstration point has not yet been reached.

Mr. POLLARD. It is cooperative experimental work?

Mr. GALLOWAY. Cooperative experimental work, practically. These cigars which we have here are made of the Texas filler, with Uncle Sam wrapper. These cigars are samples of the Cuban filler grown in Texas, wrapped with a Sumatra wrapper grown in Connecticut.

Mr. WOODS. The Cuban filler of Texas, while in quality as fine as anything that has ever been grown, does not yield enough. One of our selections last year instead of yielding 8 or 9 leaves to the plant, yielded 14 or 15, so that instead of getting 400 pounds to the acre we got 800 pounds. If that filler holds up, that seed will probably establish the filler industry in Texas on a safe and paying basis.

The CHAIRMAN. The difference between the wrapper and the filler is simply one of texture?

Mr. WOODS. The wrapper is very thin and the filler is heavy and strong.

Mr. GALLOWAY. The work that we have done in Florida has enabled those growers to increase their product about 25 per cent. Instead of 1,100 pounds per acre, they grow about 1,600 pounds per acre of a wrapper that is of fine quality.

The next line of projects or work that I shall take up is in connection with our work on corn breeding and corn improvement. We have this work going on in various parts of the country, the main object being the improvement of corn by breeding and selection, and the selection and development of good strains by the farmers themselves. We have made a study of sweet corn with the view of improving the quality, especially for canning purposes, and then we

have done some research work with reference to the effects of heredity on corn. As illustrations I have here two samples of corn which show in a measure the work we are doing. This type we are growing for Wisconsin and the Northwestern States [indicating sample], and it has yielded 100 bushels to the acre. It did that last year.

Mr. POLLARD. What variety is that?

Mr. GALLOWAY. We started with an early yellow Dent corn and it has been modified by selection until it has no name now. We have given it a number, 133. It yielded this year 100 bushels of shelled corn to the acre. The ear is small, but the cob is small, and the grain on the cob is very heavy.

The CHAIRMAN. That is a corn that you have developed for the extreme northern limit of the corn belt?

Mr. GALLOWAY. Yes.

The CHAIRMAN. What would be the result if that corn were planted in Kansas?

Mr. GALLOWAY. That corn would probably retrograde. It matures in ninety days, and if you moved it to Kansas it might revert and you might have a large production of stalk the first two or three years and a small production of grain. This corn [indicating another sample] we have been breeding for the Southwest, the drier sections of the country. The seed of this corn came originally from Mexico, and we have developed the variety to the point where it is yielding in a rather dry region 75 to 80 bushels per acre.

Mr. POLLARD. In regard to that yield you speak of, of those two varieties, was this yield simply taken from a little experimental patch?

Mr. GALLOWAY. No.

Mr. POLLARD. You had a field of it?

Mr. GALLOWAY. We run those usually in 10-acre plots, and we put them right alongside of experimental work.

Mr. POLLARD. And the 10 acres yielded 100 bushels per acre?

Mr. GALLOWAY. From 90 to 100 bushels per acre.

Mr. WEEKS. What did that lot adjoining yield?

Mr. GALLOWAY. From 50 to 60 bushels. In Illinois, Indiana, and Ohio, where we have been carrying on experiments with other types in connection with breeding corn, we find that our selected corn runs from 25 to 30 bushels more to the acre than nonselected. This corn, numbered 133, is the only one that matured this season as far north as we planted the different varieties. The others did not mature. The frost got them.

Mr. POLLARD. Is this due to the improved quality of the corn, or did the cultivation have something to do with that yield of 50 or 60 bushels—did the corn right alongside of it receive the same cultivation?

Mr. GALLOWAY. Yes; the same cultivation. It is simply a question of breeding into the corn the inherited ability to yield, and that can be done by anybody who knows how to select with this end in view. It can be done much more readily by men experienced in breeding, but it can be done by farmers generally if they know how to do it.

Mr. POLLARD. Did the same farmer cultivate these two plats?

Mr. GALLOWAY. Yes.

The CHAIRMAN. It was altogether then a matter of seed selection?

Mr. GALLOWAY. Yes; you can take the same corn differently selected, and you can take an ear of corn and make a complete row from that ear. One row may yield 65 bushels an acre and a row right alongside of it will yield 85 bushels, while another row will yield 45 bushels. The lower yielding ears we throw out.

Mr. LAMB. How many ears are there on a stalk?

Mr. GALLOWAY. From 1 to 2.

Mr. LAMB. You can educate it up to yielding 2 ears every time—our farmers do that in Virginia.

Mr. GILHAMS. Do you try to breed it 2 ears to the stalk, or more?

Mr. GALLOWAY. We try to educate it to yield 2 ears to the stalk or at least 1 good ear; from unselected seed there will be many barren stalks.

Mr. POLLARD. What do you mean by 100 bushels to the acre; is that corn?

Mr. GALLOWAY. That is corn.

Mr. POLLARD. That is shelled corn?

Mr. GALLOWAY. Yes; or taking it another way, it is 70 pounds to the bushel in the ear.

Mr. McLAUGHLIN. He says that it yielded "100 bushels of well matured ears."

Mr. GALLOWAY. Seventy pounds to the bushel.

Mr. RUCKER. It does not mean 100 bushels on the ear, but it means that when weighed in the ear, at 70 pounds to the bushel, it was 100 bushels.

Mr. GALLOWAY. We have been for several years breeding sweet corn for the purpose of enabling canners to utilize it better, and we have been breeding more sugar into it and adapting it to certain regions where sugar corn might be a money-making crop. We have here a sample of sugar corn that was bred this year. We started with that work here in Washington in 1904, and this corn yielded last year 74 bushels, 70 pounds to the bushel. That [indicating sample] is strictly a sweet corn for canning purposes.

The CHAIRMAN. What is the usual yield of that sort of corn?

Mr. GALLOWAY. It is usually very small.

The CHAIRMAN. Where was the corn grown that made this yield?

Mr. GALLOWAY. That particular corn was grown on the Potomac Flats here. We have another kind that is grown in Connecticut.

Mr. HAWLEY. Have you done any breeding work in Washington?

Mr. GALLOWAY. We have not done any work in that section. In this little chart we have shown the regions in which we have located our breeding stations. The map, as you can see, is not very well spotted as yet.

Mr. HAWLEY. You have not done anything in there [indicating on map] at all?

Mr. GALLOWAY. We have done nothing there as yet. We have one station in Washington.

Mr. HAWLEY. We are very much in need of a good corn.

Mr. POLLARD. Have you done any work in the great corn belt in the way of getting a variety of corn there that will be a better yielder than is now grown in that section?

Mr. GALLOWAY. Yes, we have done work in several of the States, and of course some of the States have also done considerable work.

Iowa has done some, Nebraska and Kansas are doing a good deal, and Illinois, Indiana, and Ohio are also working with corn; but the work as yet that has been carried on has not had any material effect on the total yield, for the reason that the farmers generally have not become familiar with the comparatively simple methods of breeding and improving corn.

The CHAIRMAN. I should like to remark here that the Kansas Experiment Station has been carrying on a corn campaign for the last two years that seems to be exciting a great deal of interest in the State. They do it by organizing corn contests in every county, providing a term in the agricultural college as a prize for the boy who produces the most corn. I noticed a few days ago that the winner of the contest in my home county cultivated one-eighth of an acre which produced at the rate of 120 bushels to the acre.

Mr. GALLOWAY. We are endeavoring in our investigations to work out certain general principles that can be applied in the matter of breeding corns, and then encouraging farmers generally to apply those methods wherever it is practicable to do so. To that end we are publishing from time to time farmers' bulletins and other documents on methods of improving corn and of taking care of corn after it is bred up to a certain standard.

Mr. LEVER. Have you ever examined into the practicability of the so-called Williamson corn planting method.

Mr. GALLOWAY. Yes; we have a number of farmers in the South this year growing corn under the Williamson method, with great success.

The CHAIRMAN. What is the Williamson method, briefly?

Mr. GALLOWAY. It is a method devised by a gentleman named Williamson, having for its object the stunting of the corn at a certain time, and throwing it into ears instead of stalk. The tendency of the southern corn is to produce stalk instead of ears, and Mr. Williamson has devised a cultural system by means of which at certain times he applies fertilizer, and that has a tendency to check the growth of the stalk and throw it into the ears. He has produced 100 bushels to the acre in certain parts of South Carolina.

The CHAIRMAN. On what theory is it that the fertilizer checks the growth?

Mr. GALLOWAY. The application of the fertilizer is after the growth of the corn is stunted.

Mr. LEVER. They stunt the growth of the corn and then they allow it to stand for six weeks or more, and the little plants get as yellow as gold, and then they begin to fertilize it, and by rapid cultivation with fertilizer they get a tremendous yield.

Mr. GALLOWAY. The fertilizer is not put in until the corn has been growing for some time. It is a well-understood fact that fertilizers applied at certain periods of the growth of plants will produce similar effects.

Mr. GILHAMS. The fertilizer is for grain development and not plant development?

Mr. GALLOWAY. Yes; certain fertilizers will have a stimulating effect in the matter of seed production, and the stunting effect on the forage production. That is unquestionably what takes place with

Mr. Williamson's method. The stalk is first stunted, and then by the application of strong fertilizer they force it at certain stages of its development, which throws the whole energy of the plant into seed.

Mr. LAMB. We did that thirty years ago.

Mr. GALLOWAY. The principle is well understood.

Mr. COOK. Your sample, No. 136, Doctor, originally imported from Mexico, seems to be well adapted for dry climates.

Mr. GALLOWAY. Yes, sir.

Mr. COOK. I would like to know whether your Bureau is prepared to furnish any of the seed of that corn?

Mr. GALLOWAY. Yes; we have small quantities of seed which we shall be glad to put in the hands of good men in dry sections who will become interested with us with the view of growing corn in their own sections and extending it among their neighbors. This corn was imported from Mexico, and we have had a number of other things brought in recently that we are experimenting with and trying to adapt to conditions in the Southwest, not only for humid sections but for arid and semiarid sections. We have found corn growing in Mexico that has the faculty of rolling up its leaves when it becomes too dry, thus stopping all transpiration, and then opening again at night. We have been told by men who have seen it that to one riding through a field in the morning it appears like an ordinary field of corn, but in the middle of the day it has all the appearance of a drought-stricken crop, the leaves being all rolled up. Then they open up again in the evening.

Mr. POLLARD. As to this corn, would that be adapted to some of the arid regions farther north?

Mr. GALLOWAY. It might be developed in that section, but it is more especially adapted to the warmer semiarid sections. We are developing corn for the colder semiarid regions and for the higher elevations. These are the lines we are working on in the corn development. We are also developing corn for the semiarid lowlands and for the higher sections of the Middle West.

Mr. LEVER. Are you conducting any of these corn breeding experiments in the South Atlantic States?

Mr. GALLOWAY. Yes; we have some experiments in the South Atlantic States, but they have not yet progressed far enough to enable us to make definite statements as to the results. Although we can unquestionably get the same results there by crossbreeding that we have obtained farther north, we will not secure them as quickly.

Mr. RUCKER. If you have any experimental work going on in South Carolina, are you not likely to have the same result as with the cotton seed, that the South Carolinians get and hold all the seed?

Mr. GALLOWAY. No; I do not think so.

Mr. LEVER. South Carolina holds the record for production of corn.

Mr. GALLOWAY. Yes; South Carolina has the record of producing more corn to the acre than any other State in the United States.

Mr. LAMB. But it was done with a tremendous amount of fertilizer.

Mr. LEVER. Two hundred and sixty-four and one-fifth bushels per acre.

Mr. LAMB. Yes; that fellow put all he had and all he ever will have into it.

Mr. POLLARD. In regard to the paragraph beginning at the bottom of page 18 of the estimates, "To enable the Secretary of Agriculture to establish and maintain, at such points as he may deem expedient, laboratories for the purpose of examining and reporting upon the nature, quality, and condition of any sample, parcel, or consignment of seed or grain," and so forth, I notice that you ask for an increase of \$25,000.

Mr. GALLOWAY. Yes; that is a very different matter—standardization of grains.

The CHAIRMAN. We will come to that later.

Mr. GALLOWAY. That has no relation to breeding or improvement of grain. It has simply relation to the grading of grain after it is put into the market.

The CHAIRMAN. We will have extensive hearings on that later. That is not in connection with this subject we are discussing.

Mr. GALLOWAY. I would like now to briefly refer to some work in connection with our alkali soils. We have that work going on, and are endeavoring to secure by breeding and selection and by importation from other countries crops for growing in the semiarid regions of the Southwest on soils that are nearly alkaline. We are meeting with a great deal of success, having found alfalfas, cottons, and other crops that are alkali resistant.

Secretary WILSON. And sugar beets.

Mr. GALLOWAY. Yes; and sugar beets. The most striking piece of work in connection with our alkali-resistant crops has come about in our success with the Egyptian cotton, which I mentioned on Friday. We have a number of alfalfas which grow in alkali soils, and we are developing sugar beets which grow in alkali soils.

Mr. POLLARD. May I ask Doctor Woods whether they have any variety of corn or wheat that will grow in more or less alkaline regions, such as we have around Lincoln, Nebr.? There is a good deal of alkali in that soil east of Lincoln in that county.

Mr. WOODS. I do not think we have anything that will stand that salt. That is common salt there.

Mr. POLLARD. It is alkali, also.

Mr. WOODS. The soil is highly impregnated with common salt. We have certain varieties of wheat, but no corn that will stand that soil. I suppose it could be developed.

The CHAIRMAN. I notice that under one of your projects you are studying natural vegetation on different classes of soil, with the view of working out a method of classifying virgin lands on the basis of their natural covering. Is not this simply getting in another way at what the soil people think they can do by an examination of the soil?

Mr. GALLOWAY. No; this particular project has under consideration the alkali soils only. It is found as a matter of fact that there are certain plants that are alkali indicators, and wherever they are found growing alkali formations are evident and they are a guide in the handling of those soils. The work the Bureau of Soils is doing is of an entirely different character, simply the study of the chemical properties of the soil with reference to alkali, and conclu-

sions might be reached from a chemical standpoint which the plants themselves would not agree with, that is so far as alkali soils are concerned.

The CHAIRMAN. Which would you believe, the soil survey or the plant in that case?

Mr. GALLOWAY. The plant, naturally.

Secretary WILSON. One remedy for Mr. Pollard's alkali conditions out in Nebraska is this. If you can find some kind of a plant that will grow there, no matter what it is, and plow it under, then you can grow crops on that alkali soil. If you have only a small patch like the depression of an old lake, if you will put some barnyard manure on it you can grow crops there. It is simply a question of getting the acid of the manures on to neutralize the alkali.

Mr. GALLOWAY. We have developed some of these alkali-resistant crops and they have been very successful. The Australian saltbushes have been brought in and grown in certain regions and they are worthy of wider application. They were brought in for the purpose the Secretary has mentioned, of getting the salt taken up and getting humus into the land so as to neutralize this salt.

Mr. BEALL. In the central-northern portion of Texas, the cotton portion of Texas, the farmers suffer considerably from plants dying in isolated spots over the field. Is that due to alkali in the soil?

Mr. GALLOWAY. No; they call them alkali spots, but they are fundamentally due to a fungus that is especially fatal to cotton.

Mr. BEALL. Have you been able to produce any plants that will resist that root rot?

Mr. GALLOWAY. We worked without success for a number of years with the idea of securing a cotton that was resistant to root rot, but we have been successful in pointing out methods of improving the soil so that this trouble can be in a large measure overcome. If you put into these spots organic matter, such as stable manure, that, as you probably know, will obviate the difficulty. Turning green crops under also removes the trouble, and deep, late-fall plowing remedies it. We have here pictures of land plowed right across one of those dead spots, with cotton growing successfully on one side and all dead on the other side, showing the source of the trouble to be lack of humus and poor aeration of the soil.

Mr. KNAPP. We took 20 acres where every stalk on the 20 acres was diseased in 1906, and we plowed it deeply in the fall, and the reports show that this past year there was no trouble from root-rot there at all.

Mr. COOK. How long does it require for this corn, sample No. 136, to mature?

Mr. GALLOWAY. That corn is a long-maturing corn, and I think it takes from one hundred and twenty to one hundred and thirty days. It is not a quick-maturing corn like the yellow corn.

Mr. LEVER. In my State—South Carolina—when I was a boy we used to grow considerable quantities of wheat, and we grew it successfully. A great many of the farmers complain to me now that they can not grow wheat successfully, they make failures from year to year with wheat, and they have practically quit growing it. What is that due to; what causes that failure, the poor seed, or the cultural methods, or what?

Mr. GALLOWAY. In all probability it is the cultural methods and the system of cropping generally that has practically worked all the humus out of the soil, but where farmers have been plowing under crops of legumes, peas and vetches, they have renewed the yielding quality of the soil. But undoubtedly you must have varieties of wheats that grow successfully there. The hard wheats that grow successfully in the Middle West soon run out in South Carolina, but there are types of wheat that under proper cultural systems and under rotation of crops could be successfully grown.

Mr. LEVER. That is a very important problem with our people, and I would be glad if the Department would look into it.

Mr. LAMB. We can not make wheat in eastern Virginia as we formerly could.

Mr. GALLOWAY. You ought to.

Mr. LAMB. We can where we put lime in. We lack lime; that is the trouble.

The CHAIRMAN. Proceed, Doctor.

Mr. GALLOWAY. I was referring to miscellaneous breeding projects, and I mentioned one having for its object the securing of rust-resisting asparagus. Asparagus is very important in certain parts of this country as a vegetable crop, and also for canning, but the rust has invaded the fields in California, New Jersey, Massachusetts, and other places where it is grown extensively. In California the experiment station has been very successful in pointing a way to prevent the trouble, but there they have a peculiar climate which enables them to improve the conditions, which are quite different from those in the East. Here we believe our principal effort should be in securing the types that are rust resistant, and to that end we have brought in species of asparagus from different parts of the world, and in Massachusetts, working in cooperation with the experiment station and with extensive asparagus growers, we are trying to secure types that are rust resistant. We have already by selection found that certain stalks growing here and there in fields are rust resistant, and using those as a basis we are hybridizing and breeding for rust-resistant types.

The CHAIRMAN. To get strains that will resist this disease?

Mr. GALLOWAY. Yes.

The CHAIRMAN. Will it be necessary to expand the appropriation for that every year, or can you continue with the appropriation you devoted to that purpose last year, about \$1,500, and continue this work of developing hybrids?

Mr. GALLOWAY. We could continue it with \$1,500, but we have added an estimate there of \$2,500 in order to round out the work and to apply it in a somewhat broader way; but that is probably as far as we will ever want to extend the investigations or extend the appropriation, about \$4,000 a year. That project will probably never require any more than that. It is relatively a small project. We could continue at \$1,500 a year, but it would take longer to reach the result than with an additional amount.

The CHAIRMAN. I do not know whether you have gotten the idea that I have had in mind in referring to some of the preceding work you have discussed here, that it seemed to me that inasmuch as you could only produce a certain number of generations of a plant in a

year anyway it would be a waste of money to have the work going on at a dozen different places, where it is all experimental; that your research work might better be confined within comparatively narrow limits until you develop something that you are sure of.

Mr. GALLOWAY. It is the extension of that work into other sections of the country that frequently gives us the very keynote of our success. We might fail continually at one place, whereas at another point 50 or 100 miles distant we might strike the very thing we are seeking. Hence we find from experience that it is advisable in work of this kind to have practically the same work going on at two or three places. We have the main part of the work going on here, and are developing this asparagus growing in our own greenhouses, but we are testing our results in Massachusetts and also in the fields in New Jersey, and if our products prove rust resistant we will have a part of the problem solved. Though they prove rust resistant here, when we move them to some other place they might not prove so.

The CHAIRMAN. When these plants are sent to Massachusetts, is that work done by the Government or by private enterprise?

Mr. GALLOWAY. In Massachusetts part of the cost is borne by the State experiment station and part by the asparagus growers themselves, who have an organization. Land is furnished, through the State experiment station, at Concord, Mass. We furnish the expert and are paying the expense of the experiments in producing the rust-resistant types.

Mr. HAWLEY. They have tried them in several different localities?

Mr. GALLOWAY. Yes.

The CHAIRMAN. Referring to your experimental work generally, is there any instance in which you are furnishing money only?

Mr. GALLOWAY. No, sir; we do not follow the plan of simply furnishing money to the station.

The CHAIRMAN. To the station or to individual cooperators?

Mr. GALLOWAY. No, sir; it is usually an exchange, the station or cooperator furnishing the money and we furnishing help.

Mr. WEEKS. Do you think it practicable when you go into a State to do such work as you are speaking of now, to establish a relative portion of expense which shall be borne by the Government, by the State, and by the growers, as a general rule?

Mr. GALLOWAY. We do that, as a general thing.

Mr. WEEKS. You do not always do it?

Mr. GALLOWAY. No, sir; we do not always do it.

Mr. WEEKS. Why not?

Mr. GALLOWAY. Because the conditions are not always so that we can do it, but as a rule that is the practice followed. Where we can get the cooperation of individuals and the State and the Department, that forms, of course, an ideal condition for conducting work.

Mr. WEEKS. Suppose individuals will not agree to that?

Mr. GALLOWAY. Then, as a rule, we do not do the work. I do not recall any instances where individuals themselves do not agree.

Mr. WEEKS. Suppose the State does not agree?

Mr. GALLOWAY. If the State does not and does not give any good reason why it should not, then we will do the work anyway.

Mr. WEEKS. You will do the work anyway.

Mr. GALLOWAY. Yes, sir. I might say that we have memorandums of understanding with experiment stations and others, where we undertake work of this kind. That is to avoid any complication or legal difficulties. These memorandums are not contracts. They are merely memorandums of understanding between the station on the one part and ourselves, or between private people and ourselves. They are drawn up, and we set forth specifically and thoroughly what the expense of the Department shall be and what the expense of the individual or station shall be, and then the memorandum is signed, and we work according to that agreement. We have agreements now with practically all the stations. In connection with this matter we have discussed we had last year invitations from certain of the grape growers of New York State to inaugurate work with the view of preventing black-rot of the grape. The invitation came from the State board of agriculture of New York, an organized body, and we made our preparations to cooperate with those people as seemed wise, when we had information from the Cornell Experiment Station that such work would not be looked upon with favor by the station. The whole matter resulted, however, in our having a complete understanding with the Cornell station, and the work on grapes went on in the State in the spring and has been quite successful, has it not, Mr. Woods?

Mr. Woods. Yes.

Mr. GILHAMS. I notice in those little maps you have here, in regard to the development and growth of corn, Indiana and Illinois have been entirely left out in each of the maps, while experiments are going on all around them. Why is that?

Mr. GALLOWAY. Because Illinois and Indiana are both taking care of this well through their own stations. Illinois has been especially active in breeding corn, and we have with us the man who had much to do in starting the Illinois work, Mr. Shamel. They are doing good work also in Iowa and several other States.

One of the lines of this series of miscellaneous projects is an interesting one, as yet incomplete, and was developed by Doctor Cushman of the Office of Public Roads. This has for its object the testing of certain feldspathic rocks as fertilizers. One of the greatest troubles the farmers are put to in this country is with reference to the fertilizing of soils and the use of potash salts. We import almost all of our potash fertilizers. In his work on road materials Doctor Cushman discovered that when certain feldspathic rocks which are abundant in this country, especially in the Eastern States, were finely powdered and applied to the soils, the plants reacted favorably. That opened the question of the utilization of this potassic material as a fertilizer, and we are carrying out in field tests some of the laboratory experiments Doctor Cushman has made in that connection. We are applying this potassic rock to tobacco, and some results that are very encouraging have been secured. In one year we found as good results from this potassic rock, which can be put on the market at \$4 a ton, as we had from the \$90 fertilizer; but in other years we did not get as good results. We want to carry on these experiments in ground feldspars. They are used now usually in the manufacture of pottery, and are ground to an impalpable powder, and when supplied in that shape to the soil as fertilizer, although chemical analyses do not show any plant food present, the plant finds it just the same.

Mr. LAMB. Where is this rock found?

Mr. GALLOWAY. Everywhere around here and in many parts of the country. There are millions of tons of it in these rocks along the Potomac River.

Mr. RUCKER. If you can utilize rocks, Virginia and West Virginia will become the most prosperous states in the Union.

Secretary WILSON. Colorado has plenty of that red granite rock.

Mr. GALLOWAY. On last Friday we were discussing the ability of crops like the cowpea, clover, and so forth, to get nitrogen from the air and utilize it in the building up of their own bodies. Here [indicating] is a specimen of the roots of the cowpea with the nodules on them. Here [indicating] is a specimen of the roots of alfalfa with the nodules.

The CHAIRMAN. How much would those nodules analyze?

Mr. WOODS. I do not know how much they would analyze, but an acre of that legume will fix about \$30 worth of nitrogen in a season.

The CHAIRMAN. How much is that worth?

Mr. WOODS. Nitrogen, as nitrate of soda, is worth about \$60 a ton. We send out of the country millions of dollars worth of nitrogen every year in our crops, and all the nitrogen that we get back comes in the way of imported fertilizers. We must find some way of making up for that loss without importing. We are doing it through the production of legume crops in the South and West, and of clover wherever it can be grown. What we do with these nodules is this: In the laboratory we simply, by laboratory methods, develop within these organisms the power of growing much more rapidly, of producing much larger nodules, and of fixing much more nitrogen than they would in the wild condition. This [indicating] represents the wild state, and this [indicating another sample] represents the wild plant after it has been treated in the laboratory and encouraged to produce more nitrogen. Here is a culture of alfalfa put up ready for mailing. That is sufficient to treat about 2 bushels of seed.

Mr. HEFLIN. What do you do with it; put it in water?

Mr. WOODS. In water; and the seed is sprinkled with it.

The CHAIRMAN. What is the chemical combination in which the nitrogen appears here?

Mr. WOODS. The nitrogen is probably in the form of nitrate. It is nitric acid combined with lime. It is immediately available, and is taken up by the plants in the course of growth. Let that [indicating sample] stand, and in about two weeks those nodules will disappear and a new crop will develop on the plant.

The CHAIRMAN. The plant draws the nitrogen?

Mr. WOODS. Yes; and absorbs the nitrogen in the tubercles.

The CHAIRMAN. For the support of its own construction?

Mr. WOODS. Yes.

Mr. LAMB. And when the plant is cut off and plowed under I presume that the nitrogen gradually becomes freed?

Mr. WOODS. In the form of nitrates and ammonia. The bacteria have the power to draw the nitrogen from the atmosphere and fix it with lime in the tissues of the plant, getting their sugar from the plant.

Mr. GALLOWAY. We have all the nitrogen we would want to use forever in the atmosphere if we could only get it out and use it. That plant fixes it. We get the people to whom we send these cultures to

report to us and the records are tabulated. In this way we are getting much new light on the relation of certain of these organisms to new soil types, and that is one of the main objects of this increase of \$5,000 we have asked for our bacterial studies.

Mr. Woods. These nitrogen-fixing organisms that work in connection with legumes constitute only one group of nitrogen fixers. There are other types which grow independently in the soil, not on the roots of leguminous plants, but which obtain their sugar from the decaying roots of almost any crop. This other variety, which is in the wild form in many soils containing lime, is subject to cultivation and improvement and distribution the same as this nodule form [indicating], and it will fix about the same amount of nitrogen. We find also that these nitrogen fixers are associated with other types of bacteria which cause the decay of organic matter, both vegetable and animal, and change it from ordinary albuminoid nitrogen to nitrogen available to plants; that is, in the form of ammonia or in the form of nitrates. This type of bacteria is called the ammonifiers, and while they do not fix atmospheric nitrogen, when they grow in connection with free forms that do fix nitrogen they work more actively; so that this new extension of work is to determine the areas of the country where these forms occur. We find, for example, in western Texas and western Nebraska and eastern Colorado considerable areas where if you plow humus into the soil it does not rot, but remains without change. We found bases of straw stacks that had been plowed under fifteen years ago, as the farmers said, and you could get straw out that was practically the same as when plowed under.

The CHAIRMAN. Why is that?

Mr. Woods. We suspected that might be due in part to the absence of these ammonifying bacteria, and we find that it is, and the problem is to introduce them and maintain conditions favorable to their action, just as you introduce these legume bacteria into soils where they do not occur and where the plants have no nodules and have to depend on the soil for their nitrogen. The whole question of soil fertility is bound up with the problem of the presence of certain bacteria which cause the changes, causing the rotting of plants and humification of vegetable matter and the formation of ammonia and of nitrates; so that the whole question of availability of the organic matter plowed into the soil depends upon the presence of certain forms of bacteria. There are some 30 or 40 species known which cause ammonification and nitrification in varying degrees, some of them very active workers and some of them are not. We are trying to get better acquainted with these forms and their natural distribution, to see which ones we can improve for use in agriculture. We have now several types which we feel sure will be very useful in bringing about these changes, especially in the West, in the peat soils of the Lake region, and in the South, where the humus is in an acid form. It is a dark form of peat that is not available to crops, but which has locked up in it a large amount of nitrogen. Now, when we introduce these ammonifiers into the peat and put a little lime with them, or allow the peat to remain exposed to the air and the nitrogen becomes available in the form of ammonia, the peat gradually gives up its nitrogen and changes into humus.

Mr. POLLARD. May I ask whether these soils in western Nebraska and eastern Colorado are fertile?

Mr. WOODS. Yes; in some areas very fertile. They have large quantities of nitrate formed by certain nitrifying bacteria in all probability. In other areas there is plenty of potash and plenty of phosphoric acid, but the nitrification has not taken place, and the thing to do is to introduce some of these nitrifying bacteria and make conditions favorable for their development. It is not a hard matter to introduce the wild forms. It is simply necessary to take some of the soil known to contain the organisms and scatter it over the field. Then by proper cultivation to conserve moisture organic matter will form humus as in other soils.

Mr. POLLARD. If the soil is fertile, what is the use of this experiment?

Mr. WOODS. In some cases it is not fertile; in others it does not retain its fertility. After you cultivate it a few years the humus disappears. Organic matter does not decay there, and every crop you take out of the soil reduces it just that much. The object of the experiment is to find out why these soils do not develop fertility the same as soils in other parts of the country.

Mr. GILHAMS. Is this peat you speak of in high land or is it in marshy beds?

Mr. WOODS. It forms in the marshy beds, and it remains in the soil as peat when the water is drained off, and it will bear no crops except those that will grow in acid soils until it is limed or exposed to the air for some time.

Mr. GILHAMS. We have large peat beds all over northern Indiana and Michigan.

Mr. WOODS. Yes; and they are very fine soils when they are broken up and allowed to ripen, but the fertility of those soils can be greatly improved, and that improved condition can be hastened by the introduction of these ammonifying bacteria, which are not naturally present in most peat soils.

Mr. POLLARD. Reverting to the suggestion of Mr. Lever. Take it in our section of the country, and I think it applies to the whole area running from the Canada line clear down to Oklahoma; take it in my State, we used to raise lots of spring wheat; in fact, that was the only wheat that we grew. I remember in the early days my father used to raise wheat extensively, 25 and 30 bushels to the acre, spring wheat, and no winter wheat at all, and now it is practically the reverse, and there is practically no spring wheat grown, and when it is sown there it never makes any yield. When they get 15 bushels to the acre they think they have a tremendous crop, and the average would be under 10 bushels to the acre—8 or 9 bushels. Winter wheat does do well. I would like to inquire why it is that the spring wheat has run out. Is it due to the fact that the seed has run out or to the fact that the grain has taken out of the soil certain of its productive qualities that were once present?

Mr. WOODS. Spring wheat probably requires more nitrogen than winter wheat. The spring wheat is also naturally the lower yielding wheat by 3 or 4 bushels; and is not well adapted to the climatic conditions of southern Nebraska. Rust and smut injury has had a great deal to do with the running out of the spring wheat. Most of the

spring wheats with the exception of durum can not mature ahead of the rust. The winter wheats mature earlier and escape the rust.

Mr. POLLARD. Even when the rust is not present, we can not get a yield.

Mr. WOODS. No; they never yield as high as the winter wheats.

Mr. POLLARD. We can not get enough so that it pays to sow the spring wheat at all, and the result is that the farmers have practically quit attempting to grow spring wheats.

Secretary WILSON. You plow up an old pasture and try it.

Mr. POLLARD. Yes; that is practically virgin soil; but I mean where you change crops with rotation.

Mr. WOODS. We have not done much with the spring wheats except the durum because the winter wheats are higher yielders. Durum is a high-yielding spring wheat and a drought and rust-resisting wheat, altogether a very fine wheat—that will probably replace other wheat in the western two-thirds of the Great Plains area; but the hard Turkey wheat (Kharkof) which we have recently introduced from Russia has been very successful east of the 100th meridian. We have extended it 200 miles farther north than the present hard winter wheat area. Kharkof is a higher yielding wheat and a very fine bred wheat, and is very much more profitable than any other wheat that can be grown in eastern Plains Region.

Mr. POLLARD. That is the wheat that is grown in our country.

Mr. WOODS. We have been introducing it there.

Mr. POLLARD. Would any of these bacteria which you have been discussing restore that which has been taken out of the soil so that we could grow spring wheat there? Of course it does not apply to my State so much, because the winter wheat is more profitable, but a little farther north you can not grow winter wheat.

Mr. WOODS. I think if you would plow under legumes as the Secretary has suggested you could almost double the yield of wheat.

Mr. POLLARD. Then the solution of this question in this country is the sowing of the land to legumes and allowing it to lie for a few years, and then plowing it under?

Mr. WOODS. One crop of legumes plowed under would do much good.

Mr. GALLOWAY. It seems to me that the trouble out there is not with the wheat, but with the system of farming. They have done something very similar to what they have done in California. They have run their land to wheat so long that they have destroyed the humus. If they would adopt some specific method of rotation with legumes as they do in other portions of the country they could grow wheat as they do anywhere else. Is not that true, Mr. Secretary?

Secretary WILSON. Yes.

Mr. GALLOWAY. The great 16 and 20 and 24 horsepower machines in California have been the ruination of the lands in that State. It is so easy to grow wheat that they have kept on growing it and the wheat is failing, and they will have to come back to smaller plantings and smaller acreage and a greater diversification and rotation with legumes to grow wheat again.

Mr. Chairman, if there are no more questions along this line I will ask Mr. Woods to present the water purifications experiments which come under this head, and to explain what we are doing with that.

Mr. Woods. We have not done any special new work with reference to controlling algæ contamination, but we have been applying what we have worked out and presented here in previous years. We have now treated 200 water supplies in the United States with a dilute solution of copper, usually one part to a million, and usually one treatment is enough to entirely exterminate the objectionable organisms. The Panama Canal water supply became infected with these algæ, and it made the water bad to drink and it gave off a bad odor. The Secretary was requested to send an expert down there, which he did, and one treatment cleaned the reservoirs, and it is said that the water has since been in a most excellent condition. All that we are doing along that line is giving advice where it is necessary, and examining water supplies to determine the number and kind of organisms present, and the amount of copper necessary to eradicate them.

The CHAIRMAN. You have finished your research work?

Mr. Woods. We have finished our research work along that line. Along the line of farm water supplies we have given special attention to the wells on the farm with a view to determining to what extent they are contaminated by bacteria, those that are associated with typhoid fever. We had an excellent opportunity here in the study of wells on the dairy farms around Washington. We found that a large number of the wells were badly contaminated with the colon bacillus, which is the one usually supposed to indicate the presence of the typhoid organism. The Bureau of Animal Industry is continuing this work as a part of their regular examinations, and they find as we did that farm wells generally are badly contaminated. We want this next year, if we can, to determine the extent to which copper can be applied in purifying and sterilizing these wells so far as these pathogenic bacteria are concerned. The use of a solution of dilute copper will cut out these organisms without destroying harmless bacteria which the water also contains that are necessary to give to the water its life and some of which are also valuable in protecting the human system from pathogenic forms. If we killed all the bacteria, the resistance of animals that drink the water to pathogenic bacteria would gradually decrease.

The CHAIRMAN. Your idea is that distilled water is injurious, in the long run?

Mr. Woods. Distilled or sterilized water is exceedingly injurious. You do not want water free from bacteria, but you want it free from pathogenic bacteria, and that is the reason we worked out the copper treatment to such a fine point. You can make your solution of copper of such strength that you can pick out one kind of bacteria and destroy them and leave the others.

Mr. GILHAMS. Then drinking boiled water is injurious?

Mr. Woods. Drinking boiled water exclusively is detrimental to health.

Mr. LAMB. Are not people boiling their water for drinking purposes all the time?

Mr. GALLOWAY. Under certain conditions boiled water may be very beneficial.

Mr. Woods. If you suspect that the water contains a dangerous organism, it is much better to boil it than to drink it raw, unless you can properly treat it with copper or filter it.

Mr. LAMB. All you have to do is to throw some copper down your well?

Mr. WOODS. You want to get the right amount down, otherwise it will act as an emetic.

Secretary WILSON. It is the same way with milk.

Mr. WOODS. Yes.

Secretary WILSON. If you kill all the organisms in milk, it is injurious.

Mr. WOODS. I believe that it is. If you keep persons away from everything containing germs and do not give them any food or water or anything that contains bacteria, they lose their resisting power, and the person who has led a sterilized life in that way, if he comes in contact with some of these bacteria that an ordinary person would overcome, succumbs at once.

The CHAIRMAN. The ordinary well might have these pathogenic bacteria?

Mr. WOODS. Yes.

The CHAIRMAN. How do they get in there?

Mr. WOODS. Very often the contamination is accidental. A rain-storm will wash in some surface material, and the water becomes contaminated in that way. As a rule the sources of the water are not contaminated, and if you clean the well out and sterilize it, it remains in a good condition for a long time, provided you protect it against surface drainage. Our experiments show that one part of copper to a million parts of water, if the water is not too hard, is sufficient to destroy the colon bacillus in four or five hours.

The CHAIRMAN. How do you get at that, practically, the adjustment of the number of parts of copper to the parts of water?

Mr. WOODS. We first determine the amount of alkali that the water contains, because the alkali combines with the copper and forms an insoluble compound, so that if there is lime in the water we have to put in more copper to get the very minute trace of copper that is necessary. So we analyze the water for lime, and if we have a very limy water we put in perhaps one part per hundred thousand.

The CHAIRMAN. How do you determine your million drops of water and your one drop of copper?

Mr. WOODS. We determine the quantity of water to be treated. We know the weight of a gallon of water. After determining the weight of water to be treated we weigh out enough sulphate of copper to make one part per million parts of water or at any other rate desired. For treating a quart or a few gallons of water we use a 1 per cent solution, say 5 drops to a quart of water. In treating a well we determine the number of cubic feet of water in the well, and then we put in enough sulphate of copper by weight to make one part per million parts of water.

Mr. GILMANS. The wells in Iowa, Illinois, and Indiana are driven wells. How are you going to treat them?

Secretary WILSON. They are generally in good shape. They do not let the surface water get in.

Mr. WOODS. It is seldom they become contaminated.

Mr. HAWLEY. Has this information been put in print so that the owner of a well can work out his own salvation?

Mr. WOODS. No, because he can not analyze the water and can not test it to see if the organism is present.

Mr. HAWLEY. He can have it analyzed.

Mr. WOODS. Yes; there are many persons who are competent to analyze the water and determine whether the bacteria are present.

Mr. LAMB. How much would a man suffer if he were to throw a little copper down there anyway?

Mr. WOODS. If you get more than one part by weight per hundred thousand of water it will act as a powerful emetic.

The CHAIRMAN. How is your use of copper in typhoid cases being extended?

Mr. WOODS. It is being extended quite rapidly. In the West, at Lincoln, Nebr., Doctor Stevens has used it in quite a number of cases. He used it at about the rate of one part to one hundred thousand parts of water as soon as possible. He washes the patient's intestinal tract out as thoroughly as possible with sulphate of copper one part to ten thousand (10,000) parts of water, and gives them copper water to drink and copper milk to drink, and since he has used the copper treatment, he told us that he had not lost a case of typhoid or had a single complication with typhoid, and so far as his experience went, it worked the best of any treatment he had ever used or heard of being used for typhoid fever, and he said that in his opinion it stood at the head of all treatments for typhoid fever. If he could get a case within the first week, he said that he could prevent the development of the fever beyond that point.

Mr. COOK. In connection with that typhoid germ matter I would like to ask a question. I would like to ask you what effect the drinking of alcoholic drinks generally will have upon the typhoid germ or other germs in water. I am not engaged in that business and never have been, but I would like to ask for information.

Mr. WOODS. That is out of my line, and I do not know what effect it would have. I know that bacteria can stand considerable alcohol. A 4 or 5 per cent solution of alcohol will not destroy most bacteria, and some of them can stand a 10 per cent solution of alcohol, while other bacteria will stand a 15 per cent solution.

Mr. WEEKS. What form of copper do you use?

Mr. WOODS. Copper sulphate.

Mr. HAWLEY. Are there other forms that are just as good?

Mr. WOODS. Yes; if you take a piece of copper wire, copper plate, or foil, and let it stand over night in water, it does the same thing, although if you have that water analyzed, you can not find a trace of copper in it.

Mr. HAWLEY. But it puts the copper in the water?

Mr. WOODS. Yes; 4 square inches of surface of clean copper foil to each quart of water will destroy all typhoid colon bacilli and all Asiatic cholera bacilli, and all bacteria of that type, in five or six hours. Only a trace of the copper goes into the solution in the water but there is enough to do the work.

Mr. LAMB. Have you been sending that in the shape of pamphlets to the country, the information in regard to that treatment by copper?

Mr. WOODS. We have not written anything on the typhoid treatment, because that phase of the work is not within the province of the Bureau of Plant Industry. We have sent out hundreds of these sheets [indicating], regarding treatment with copper at the request of physicians who wanted them. This is just a copy of a letter sent me by Doctor Stevens.

Mr. HAWLEY. In what bulletin is this set forth?

Mr. WOODS. We have several bulletins on the treatment of water supplies with copper. We have 4, I think.

Mr. McLAUGHLIN. Do you class boiled water and distilled water as the same?

Mr. WOODS. It is the same thing so far as being free from bacteria.

Mr. POLLARD. Coming back to what we were discussing a moment ago, I understood you to say that the boiling or sterilizing of water ought not to be done, generally; that is, that sterilized water is not good for a person to drink and keep it up. Do these bacteria that are in the water, that are always present, aid in the direction of our foods?

Mr. WOODS. Yes; to some extent.

Mr. POLLARD. And the bacteria which we take in in drinking milk or water are of assistance in digestion?

Mr. WOODS. The bacteria of sour milk are supposed to be, by the most experienced investigators, most beneficial. The Pasteur Institute has found, for instance, that the bacteria of sour milk live in the intestines and prevent, if they are present in large enough numbers, the development of typhoid and similar pathogenic bacteria, and Metschnikoff, the head of the institute, says if people would drink buttermilk and sour milk they would lengthen their lives ten to fifteen years.

Mr. RUCKER. What do you mean by sour milk, not soured sweet milk?

Mr. WOODS. Yes; soured sweet milk.

Mr. LEVER. Clabber?

Mr. WOODS. Clabber; yes.

The CHAIRMAN. On Saturday I obtained permission for this committee to sit during the sessions of the House, and we will resume this hearing at 2 o'clock this afternoon.

(At 12 o'clock m. the committee took a recess until 2 o'clock p. m.)

AFTERNOON SESSION.

The committee met at 2 o'clock p. m., Hon. Charles F. Scott (chairman) in the chair.

STATEMENT OF MR. BEVERLY T. GALLOWAY, CHIEF OF THE BUREAU OF PLANT INDUSTRY—Continued.

The CHAIRMAN. I believe you were talking about water bacteria investigations.

Mr. GALLOWAY. We have nothing further to add to that subject, if there are no questions.

The CHAIRMAN. Then we will pass on to the next subject.

Mr. GALLOWAY. The next subject is that line of investigation which we call bionomic, and I might mention several of the projects under investigation. First is a project having for its object the introduction into the southern United States of weevil-resistant cottons. In connection with our work in the South on cotton improvement, we have found in certain of the South American countries types of cotton that are resistant to the weevil. They have become resistant through long adaptation in weevil-infested sections, and we have

had our workers engaged in introducing those cottons and spreading them over this area that is now infested by the weevil. We have had some of those cottons grown the past season, and some are quite promising. We have here a sample of the boll of one of the Central American cottons placed side by side with one of our big-boll cottons, and you will see what a promising thing it is. The cottons are interesting and remarkable in their ability not only to resist the attacks of the weevil, but to mature early, and they have extraordinarily good staples. As another feature of that work we are introducing and trying drought-resistant cottons which would extend the cotton growing area to about this section of the map here [indicating western Texas].

The CHAIRMAN. What results have you from your experiments with drought-resistant cottons?

Mr. GALLOWAY. This year was the second year, and we have some quite promising results. We have those cottons growing in the lands above the ditches above Yuma, Ariz., and at San Antonio, Tex., and while there is considerable to be done in improving them, it is evident that they are drought resistant. The corn extension work is of a similar nature. This line of work has for its object the extension of corn into sections when our present varieties are not adapted and the breeding of corn for those particular regions.

Mr. LEVER. Before you leave this cotton proposition, is the staple of this big-boll cotton from Mexico as good as that of the ordinary Triumph?

Mr. GALLOWAY. It is not as good yet, but it could unquestionably be made as good by selection. We have not been on the selection work long enough to make this new cotton compare with the big-boll cotton of the Southern States.

Mr. LEVER. The weevil refuses to attack this cotton?

Mr. GALLOWAY. It does not refuse to, but when it does, the cotton has adaptations that usually protect the bolls by fruiting near the ground or destroy the weevils by proliferation.

Mr. LEVER. How does it destroy the weevil?

Mr. GALLOWAY. The weevil does its work through the attack on the squares, the young bolls, and the bolls themselves. Some of these cottons have the faculty of surrounding the larva, the egg, as soon as it is deposited in the boll, with a substance that the larva is not able to live upon. These cottons simply surround it with a gelatinous material that starves it to death, and such being the case, the larva would not develop and the weevil would die out. That has come from a long working together of the two in these tropical or subtropical regions.

Mr. LEVER. How long have you known of this cotton?

Mr. GALLOWAY. About four years now. We first found it when Mr. Cook made his discovery of the boll-weevil-eating Guatemalan ant, and after that we made a study of the conditions existing in these Central American States where cotton is grown, with the object of finding the reasons why cotton could be grown there. These regions are probably the native home of the cotton, where it originally developed and started from. It is probably the original home of the boll weevil, also, and the two have worked out their relations in the region from which they originally came. We find that when we have a crop that is successfully grown in this country, and is then

attacked by some disease or insect, if we can get back to the original home of that plant and study the conditions there we can usually find some method of attacking the disease or the insect.

Mr. LEVER. If you could fix this cotton in this country you would have solved the boll-weevil problem, would you not?

Mr. GALLOWAY. No, I do not think we would have solved the boll-weevil problem. It is a question of whether our conditions here will throw the cotton over on to the other side. Some of the introductions from Central America mature very early. While Mr. Cook was introducing these quick-maturing cottons, Professor Bennett, of the Texas Agricultural College, working with us, started with a cotton that he had in Texas, working along the same line, and he is getting the same result now by breeding from our present types; selecting each year from the earliest short-jointed plants. Referring to the power of some of the varieties to kill the weevil larvæ by forming gelatinous tissue we find it is only slightly developed in most of our American cotton strains; it has simply been bred or developed out because there is nothing to keep it up. It is like what Mr. Woods spoke of this morning about the sterilization of a man. If he lost his bacteria he would get so that he could not venture out of doors. A man who was thoroughly sterilized, if he got a very little of a disease, would go under.

Mr. POLLARD. I do not like to take up that question again, Doctor, but it is a very interesting question to me. We had Doctor Melvin here last week before us, and he was discussing the prevalence of tuberculosis among dairy cattle, especially of the District of Columbia, and in discussing remedies for counteracting the bad effects that follow the consumption of this tuberculosis germ by the public generally, one remedy that he suggested was to sterilize the cream before churning, so that when the butter is made my understanding was that it is practically sterilized, or pasteurized. Is not that correct, Mr. Secretary?

Secretary WILSON. Yes, you raise the heat high enough in the milk to kill all the germs, and then there are not any.

Mr. POLLARD. The butter that goes out is what we call pasteurized. Now, if this theory of yours about the sterilizing or pasteurizing of water is correct, would not the remedy that Doctor Melvin seeks to furnish for tuberculosis present a case where the work would not be in line with your scientific discoveries and research work?

Mr. GALLOWAY. I do not think so. The pasteurization of cream, as I understand it, does not destroy all the organisms present.

Mr. POLLARD. I supposed it did.

Mr. GALLOWAY. There must be organisms that persist. In fact, you can take butter and make beautiful cultures of all kinds out of it. I never knew of a sterile butter anywhere.

Mr. WOODS. If the heat goes to a high enough point you sterilize the milk; but pasteurization only requires about 155° for thirty minutes, and that destroys only the typhoid and tuberculosis germs.

Mr. HAWLEY. Doctor Melvin stated that it took 175° to destroy the germs of typhoid and tuberculosis.

Mr. WOODS. That is the outside limit. If you heat it too high the flavor of the milk is changed. This is another method of picking out

those organisms that are enemies of mankind and destroying them and keeping the beneficial ones.

Mr. POLLARD. My idea was, would it be well to encourage the introduction of Doctor Melvin's remedy if it were in conflict with this theory you have been presenting to us to-day?

Mr. WOODS. There is not really any conflict, because the temperature of 155° to 175° F. kills only the pathogenic forms and does not destroy the beneficial germs. It is the same as the application of copper to water, which kills only the pathogenic forms.

The CHAIRMAN. How much heat do you have to apply to destroy the nonpathogenic forms?

Mr. WOODS. It would have to go up to 212° F., and there would have to be three or four sterilizations, probably, to completely destroy them.

Mr. POLLARD. I understood you, Doctor Galloway, to say this morning that the pasteurization of milk ought not to be encouraged?

Mr. WOODS. No, the sterilization. Sterilization means complete destruction of all bacteria, and pasteurization means the destruction of only the pathogenic forms. We should have said that pasteurization has a very beneficial influence—it means the taking out of such forms as you want to get rid of—while sterilization ought not to be practiced, because that destroys all the germs of the milk, good as well as bad.

The CHAIRMAN. If water was heated to 200° F. and stopped just short of the boiling point, the pathogenic germs would be destroyed?

Mr. WOODS. Yes that would destroy the pathogenic forms and most of the others also. If you heat water to 160° F. for thirty minutes, 99 per cent of all the pathogenic forms in it will be destroyed without destroying the others.

Mr. COOK. If it was heated to 212° F., would not that have a tendency to destroy some of the milk and cream by evaporation?

Mr. WOODS. I do not know that it would do that, but it would change the taste and make the milk less digestible.

Mr. COOK. The reason I ask that is because before we make analyses of any of our ores—silver, gold, lead, or copper—the chemist has to heat the ore to 212° F. before he can make a correct determination of the metals there are in the sample. Therefore he must drive off the moisture entirely before he can make the determination.

Mr. WOODS. You do not have to do that with milk. You can make the bacterial determination at normal temperatures.

The CHAIRMAN. I notice you have one project here for the study of methods of coffee culture adapted to such regions as Porto Rico?

Mr. GALLOWAY. Yes.

The CHAIRMAN. Is not that work being done at our experiment station in Porto Rico?

Mr. GALLOWAY. Along the lines that we are investigating. They have not had the facilities or the funds to conduct any but the general investigations of coffee, and the work we are doing is mainly of a special nature, with a view to helping the station as far as we can and to furnishing assistance and advice when we are called upon to furnish them by American planters who are going to these islands.

The CHAIRMAN. I thought when we were talking about establishing that station at Porto Rico that the study of coffee and cacao was to be one of its principal features?

Secretary WILSON. They were so instructed, too.

The CHAIRMAN. And they are not carrying out that work?

Secretary WILSON. There are some special things to be done that they have not facilities for doing down there; so we have them keep in contact with our bureaus here, and things that they can not do as well as Doctor Galloway can he does for them.

Mr. GALLOWAY. One of the prime questions in connection with coffee culture has been the determination of the proper plants to use in rotation for furnishing nitrogen. In certain of the more successful coffee regions a system has been established of planting leguminous trees, and those trees gather the nitrogen, just as the legumes do for us, and give it up to the coffee, and it is in that connection that we have been making this coffee investigation. The same thing applies to the investigations in connection with cacao culture and banana culture and the general subject of introducing into this country avocados and similar fruits.

We have been devoting some attention, also incidentally, to rubber and substitutes for rubber from the plants that grow in parts of this country, like the Colorado rubber plant and others growing in certain regions of the Southwest, from which considerable quantities of rubber are being extracted and manufactured.

The CHAIRMAN. What have you to say in regard to the progress of your study of the methods and means of making and using industrial alcohol?

Mr. GALLOWAY. I am coming to that in a minute. That is under the next head of projects. If there are no further questions, we will pass to the drug and poisonous plant investigations, and we have there 12 or 14 groups of work, or projects, which present matters of interest. One of the problems that has been taking the attention of the bureau has had for its object the establishment of a camphor industry in this country. We import all of our camphor, which is used extensively in the manufacture of certain products, such as celluloid and smokeless powder. Two or three years ago we began an investigation of conditions in this country with a view to establishing the camphor industry here. We have been distributing camphor trees and camphor seed for fifteen or twenty years, and there are isolated trees scattered all over the South and West in the southern portions of the United States. There was one considerable grove of about 40 acres in Florida, and we had that grove placed at our disposal and began some studies with the view of seeing if we could extract the camphor profitably from these trees. We have gotten away from the usual oriental processes of collecting the camphor, and instead of killing the tree we have adopted a method of pruning it and distilling the camphor from the parts so cut off, and that has suggested other interesting lines of work—growing camphor in hedges and putting the trimmings up in bales, like bales of hay, and shipping them to a central factory for distillation, for instance. The outcome of our work in Florida was so successful that two large concerns have gone into the business and have taken our camphor expert, and they will establish two groves of about 2,000 acres each. Hereafter this work will be mainly along the line of securing high-yielding strains and of further extending the culture of camphor into other States farther north and south, and we are putting out some experimental hedges in south Texas in connection with our tea work.

The CHAIRMAN. In the other countries where it has reached large proportions, do they tap the trees as they do for turpentine?

Mr. GALLOWAY. No, sir. The usual process is to cut down the entire tree and distill from the wood.

The CHAIRMAN. The entire tree?

Mr. GALLOWAY. Yes. That was the ordinary process in Formosa, but I think the Japanese are making improvements in their methods. We have developed some processes for extracting camphor economically, and the methods are comparatively simple. These vials show the usual stages through which camphor distillation proceeds. In addition to camphor we secure a number of valuable oils which are quite useful in medicine and the arts. The camphor outlook, I may say, is quite promising, and the research part of it is practically at an end, but we want to substantiate and elaborate the work on the utilization of the trimmings where camphor is grown as a hedge plant, and the possibility of growing camphor in that shape instead of growing it in large trees and waiting a great many years. A camphor hedge will reach a good size in about the same time as the privet hedge, three or four years, so that the camphor investor can realize much quicker.

The CHAIRMAN. Do you get as large a per cent of camphor from the clippings as from the tree?

Mr. GALLOWAY. Yes, a larger percentage from the trimmings than from the body of the tree itself. That is one of the problems we have had to work out. We have developed another interesting point; that is, it was generally believed that the camphor must be taken fresh and distilled when fresh, but we have discovered that we can let the sun do a lot of the drying for us and the camphor is as readily distilled after the twigs are dry. That, also, suggests another idea—drying and baling these trimmings so that they can be forwarded from considerable distances to a central place for distillation, and it is therefore worthy of encouraging farmers, as a feature of farm work, to put in a small camphor grove, for the reason that they can ship this material quite a distance and probably get a good price for it if it is of camphor-yielding quality.

Mr. HAWLEY. How far north will the camphor grow?

Mr. GALLOWAY. On the Pacific coast as far north as Sacramento, and it grows in South Carolina as far north as Charleston. We have quite large trees in Summerville, where the tea farm is located. Once in a while the frost injures them, but with a hedge that would not make any difference.

The CHAIRMAN. How large a plant could you install on a small scale?

Mr. GALLOWAY. A small one could be installed for \$30—a small worm still. It is of the simplest kind. We have been endeavoring to work up devices of a simple nature that individuals could utilize if they desired to go into the matter in a small way.

The CHAIRMAN. What returns do you get from it?

Mr. GALLOWAY. A camphor grove that the owner was about to cut down because it was in his way has yielded \$400 an acre.

The CHAIRMAN. Was that net or gross?

Mr. GALLOWAY. That was gross. It was between \$275 and \$300 net. That grove is about 30 or 35 years old. It has been taken over by one of the large celluloid concerns, and they are preparing to utilize it in.

the manufacture of celluloid. The celluloid people are finding it extremely difficult to get camphor. In fact, it has become more and more scarce each year. The price is growing higher and higher, and all efforts to produce it synthetically have failed. A substance that resembles camphor is produced, but it can not be used in the manufacture of celluloid or of smokeless powder. The celluloid people use between \$2,000,000 and \$2,500,000 worth of camphor every year, and if one source of supply was stopped, that would be the end of it. The source of supply now is almost wholly Formosa.

Mr. HAWLEY. Where are those two farms of 2,000 acres located?

Mr. GALLOWAY. In Florida, and these plantations are being put out on cut-over pine lands that were considered practically worthless and were bought at a very small price. It is just a question now of obtaining sufficient seeds and seedlings to plant these groves. We are fortunate in having so many isolated trees all over this country, because they grow very readily and make beautiful shade trees when grown properly, producing quantities of seed.

We have also been making investigations for several seasons on hops. We import large quantities of hops, and the Pacific coast people, especially, are vitally interested in this subject of hop culture and the improvement of hops, particularly after they are grown. The finest hops are grown in certain foreign countries, and we have not been able so far to compete in every way with these products.

The securing of the best results is partly a question of cultural work in the field and partly a question of the handling of the hop after it is developed and its treatment after it has passed from the kiln and other drying processes. There are certain conditions in the drying that we are not entirely familiar with. The fermentation of hops is very much like the fermentation of tobacco or tea. There are certain processes that have been followed for years by rule-of-thumb methods, and we have been at work through laboratory processes to find out the reasons for those changes in the hops after they are produced which give certain colors and aromas. That is the line of work so far as hops are concerned. It is simply in a formative state as yet, but our attention was called on Saturday, through Doctor True's office, to the fact that the presence of arsenic in hops has been a very important question for a number of years, and the English Government several years ago appointed a commission which spent a number of months studying this subject and did not reach any satisfactory conclusion. Arsenic was found in some beers made in certain sections, and the drinking of the beers had resulted in cumulative arsenical poisoning. Doctor Stockberger, who is working on the hop question for us, has taken up the matter of the presence of arsenic in hops, and he believes he has found the source of it, something that our English friends did not discover; and that is, in connection with the hop culture, wherever the hop is grown and harvested and dried and packed it is treated with sulphur to bring out certain colors, and there is arsenic in this rather crude sulphur. That is to say, the arsenic is transferred to the hops.

That opens up the other question that the Secretary raised, as to whether or not similar conditions would not be found in our fruits, which are sulphured extensively, and that matter is now under consideration and will probably be investigated. But if the arsenic is:

there, we certainly ought to know that it is there and how it gets there, and, if possible, to eliminate it.

Next is our new project, or seminew project, on industrial alcohol, and we are asking for an increase of \$5,000 to enlarge the scope of that work. We are spending \$5,000 this year and we want to spend \$9,500 next year. The main object of this work, so far as the Bureau of Plant Industry is concerned, is to find out, and if practicable to apply, the methods of utilizing by-products on the farm and in the orchard in the manufacture of denatured alcohol.

The CHAIRMAN. That is largely a chemistry problem, is it not?

Mr. GALLOWAY. No, it is not chemical, except in the sense that we will probably use certain chemical methods in developing our processes, but when the matter was brought to our attention and the Secretary asked us to look into it, the question arose as to the growing of any crop that could be used for the production of alcohol, such as potato crops, which are planted extensively in other countries, and the utilization of other crops that become at times waste products and at times by-products—small potatoes, the refuse from sugar-beet works, and refuse from other manufactories, as well as apples and fruits of all kinds. We have started out with the idea of finding in a conservative way, first, what the possibilities are in this direction and whether it is worth while to encourage the farmer to go extensively into this sort of thing, and, second, if the materials are available, in what way the farmer can utilize those materials to his advantage.

The CHAIRMAN. Whether the materials are suitable or not can only be determined by chemical analysis?

Mr. GALLOWAY. The manufacture of alcohol is a very simple proposition, and it is not chemical any more than the making of distilled water. The question of how much alcohol a certain product will yield is merely a matter of a certain simple chemical test, and the product itself and the work itself are so closely allied with the projects of the Bureau of Plant Industry that the Secretary last summer thought it wise for us to take up the work, and we began it.

The CHAIRMAN. The only reason I asked that question is because I thought I recalled that when this work was first undertaken it was put into the chemistry bureau.

Mr. GALLOWAY. Yes, some of the work was started there, some of the earlier work, but it was largely the accumulation of facts that we already possessed and largely a question of the chemical methods of handling the alcohol after it was produced. I may say now that we have an expert abroad; Doctor Kremers, from the University of Wisconsin, who was sent abroad by the Secretary last September to study the conditions as they exist in certain European countries with reference to the production of alcohol and the particular manner in which the farmers themselves utilize it, and as near as we can see the thing at the present time there is not any great promise of denatured alcohol cutting any material figure in our industrial development, except as it affects the individual farmer. The individual farmer in various parts of the country is being pushed more and more each year for substitutes for wood, for things that he can use as fuel on his place. When, through the utilization of the refuse matter on his own farm, he can put away a certain amount of this

material with which he can warm his house and light his rooms during the winter, and during the summer can utilize in operating such farm machinery as he has, that appears to be about as far as the thing will go now.

The CHAIRMAN. Has the production of denatured alcohol increased materially since the passage of that act?

Mr. GALLOWAY. I do not think it has. We have not reached a point where it is so fully understood that it will increase.

Secretary WILSON. If you will permit me at this point, in connection with the Bureau of Chemistry we were thinking we would start a little still, putting it up on simple lines, and invite people who were interested to come and see how to run it, solely for the purpose of educating men who wanted to go into that kind of business and to teach the principles of distillation. We were thinking of doing that in the Bureau of Chemistry, but the prime question is from what source to get the alcohol. That is the prime question. It may be wise for us to bring in some of the better classes of starch-bearing plants from foreign countries. We have the cassava and the yam and the sweet potato down south, and we have the white potato up north, and so forth.

Mr. GILHAMS. Is there not another reason why the manufacture of denatured alcohol will be somewhat retarded on account of Government inspection at these stills?

Mr. GALLOWAY. Yes, that is one thing we are finding in our work abroad, that in some cases denatured alcohol would be a success if the Government did not really regulate it to death. They place so many restrictions around it that, although they have assistance as we have, the farmers get discouraged; but probably these things will correct themselves in time.

Mr. BEALL. Are they not making this alcohol now out of pine stumps and pine tops down in the South?

Mr. GALLOWAY. That is wood alcohol. They are doing that in certain places. Strange to say, the place where denatured alcohol is most successfully manufactured and used is in Cuba, where they have no revenue laws whatever, everything is free and easy, and everyone can make his own still, and they are making this alcohol—and making quite a lot of it—for about 8 cents a gallon from sugar refuse.

The CHAIRMAN. What results do you get from the refuse of sugar-beet factories?

Doctor GALLOWAY. The sugar beet will yield alcohol, but there is such a demand for the material in other directions that it has not paid as yet to utilize it for that purpose. It is almost impossible now to get dried sugar-beet pulp for stock food or dairy food without contracting for it in advance. Only a few days ago I raised the question with a factory in Michigan, trying to get it in this way in the East, in Washington, and they wrote back that they had every pound contracted for and that what they made last year had been shipped; also that they had contracted for next year's supply, and that their supply was mostly going to Norfolk, Va., the whole output of the factories being handled by a firm there.

Mr. BEALL. I presume it is used for stock feeding.

Doctor GALLOWAY. Yes, sir; they dry it and put it up in bags. It is very convenient to handle in that shape, and it can be wetted and

fed that way or can be fed as silage. They sell it at \$13 a ton so that it can compete with cheaper products, and it contains a high per cent of protein.

Secretary WILSON. As far as things have gone, I have come to the conclusion that if our farmers should now put up a little still and run it, they could grow the white potato in the North and the cassava and the sweet potato in the South, and from those sources they can get alcohol. One of our explorers last year went way up near the seventieth parallel in Siberia, where they have no wood and no coal and no oil. They grow potatoes and make alcohol for heating and lighting up there. That explorer brought half a ton of this product home.

The CHAIRMAN. Are those potatoes edible?

Secretary WILSON. They are not as good for eating as for alcohol.

Mr. GALLOWAY. It is a large and coarse potato. They get a very large yield per acre. In some places they have traveling stills that go around from farm to farm. The farmer puts away his small potatoes and fruits that he accumulates and other things he wants to turn over to the distilling apparatus, and the men with the still come around three or four times a year and distill his material and run it off into a tank, and then he uses it as he wants it.

Mr. HAWLEY. That would help to solve the problem Mr. Gilhams raised about inspection.

Mr. GALLOWAY. Then the only function of the Government is to come around once in a while and see that the seals are all right on his tanks.

Mr. WOODS. The hardest problem in making denatured alcohol is the handling of the mash. After they get the material to be fermented it has to be worked up and mixed with yeast, and the yeast converts the sugar and starch into alcohol. We have a great many kinds of yeast. Some are high producers of alcohol and some are low producers. Some of the bacteria use up the sugar and convert it into acid, so that if your mash becomes contaminated with a bad yeast you can not convert the mash into alcohol. Our problem is to eliminate the forms we do not want without hurting the form we do want to convert the sugar quickly and profitably into alcohol.

Mr. BEALL. What have you done with the sugar-beet tops in making alcohol?

Mr. GALLOWAY. We have never done anything with the sugar-beet tops in making alcohol. We only inaugurated the work last summer, and so far our work has been only preliminary, laying out the basis of future investigations and work. Doctor Kremers, who is a member of the staff of the University of Wisconsin, will be here in February, when it is planned to bring together the results of his observations abroad and what knowledge we possess here with reference to the subjects that we have been discussing. There is to be a winter school at the University of Wisconsin this year, and we will endeavor to interest the 400 or 500 students at that winter school in the possibilities of denatured alcohol and the possibilities of its production on the farm, so that Dr. Kremers will be able to do considerable work in that field.

Among other lines of investigation which we are conducting under this head are some having for their object the production of certain medicinal substances in different parts of the country. We import

large quantities of the material from which morphine is made. We have found that morphine can be made directly from the poppy, without the utilization of the opium at all. Morphine as usually found in the drug market is manufactured from opium, and the opium is imported from India and other places. Large quantities of poppies are grown in California for seed, from which an oil is also extracted, and for the flowers, and we have found that the morphine used in commerce can be extracted from those poppies direct, without first securing the opium. The usual practice in securing the opium is to take the large seed pods of the poppy and slit them with a knife—the Chinaman is patient and has plenty of time, and he goes over and slits these individual heads. The milk-like juice then exudes, the same as from the milkweed, and that dries and is scraped off, and that constitutes an impure opium. We eliminate all that process and take the poppy capsule direct, and by simple methods extract the morphine from it. That might be introduced as an industry here.

The CHAIRMAN. You first made a report on this about three years ago, as I recollect.

Mr. GALLOWAY. Yes, sir.

The CHAIRMAN. What have you been doing since then?

Mr. GALLOWAY. We have been endeavoring to get sufficient quantities of the material grown in different localities to make the work a commercial success. We have been partially successful with respect to the Pacific coast, but we have not demonstrated the practicability of growing the poppy and extracting the material from it in the more humid section. It is largely a question of growing the poppy, rather than of extracting the morphine from the poppy.

The CHAIRMAN. Are they producing it commercially by your method of work?

Mr. GALLOWAY. There were considerable quantities produced there last year. Last year we had one man with something like 20 or 25 acres of poppies, and we had a contract with him that he was to extract this material, but the crop failed. So far there have been small quantities of morphine put on the market commercially, but it can not be called a success as yet.

Mr. GILHAMS. What sort of poppies do you have to raise?

Mr. GALLOWAY. What is called the opium poppy.

Mr. GILHAMS. Is that perennial or annual?

Mr. GALLOWAY. It is an annual.

Mr. HAWLEY. With regard to the hop, the Willamette Valley is one of the largest hop-producing sections of the United States, according to your report.

Mr. GALLOWAY. Yes.

Mr. HAWLEY. In the early fall we are often caught there by the rains, and a large quantity of our hops are destroyed. We have that misfortune in the early fall, often a rain of a week or ten days. Are you making any experiments for the purpose of producing a hop that will mature in a shorter period than we have now?

Mr. GALLOWAY. That is one of the lines of work that Doctor Stockberger is working on—and endeavoring to procure special hops for special sections. An early hop is one of the things which he has been working on, and we have also imported the Bavarian hops, which are earlier than those we have.

Mr. HAWLEY. What success has he had?

Mr. GALLOWAY. The work was begun two years ago and we can not say yet what the outcome is going to be. It looks encouraging.

Mr. WEEKS. With reference to the opium matter, how long ago did you take that up?

Mr. GALLOWAY. About three years ago, I think, the first extraction was made from the poppy capsules.

Mr. WEEKS. How much longer do you think the effort should be made by the Government to develop that kind of an industry, provided it does not seem to be a commercial success at this time?

Mr. GALLOWAY. I think perhaps one more year or two more years will wind it up. If it can not be put on its feet in that time that work might just as well cease. One year or two years is sometimes hardly a fair test of such matters on account of climatic conditions or seasonal questions with regard to the growth of the crop. We have met with other difficulties. There is a sentiment against the production of this sort of plant. We have met that, and where we have had the work already started we have had people, after taking hold of the matter, plow up a crop rather than go ahead with it, although it would be perfectly self-evident that we have in mind only the production of morphine to take the place of the imported material absolutely essential in medicine. We send out of the country every year \$6,000,000 or \$8,000,000 for the purchase of little things like this that we might just as well produce here. Other drugs of various kinds might just as well be grown here, but we import these materials largely from European and other foreign countries.

Mr. LEVER. How much are you spending for this work now?

Mr. GALLOWAY. We have not these things separated. Altogether we are spending between \$6,000 or \$8,000. Not over \$1,000 of this would be used for the morphine work if we get a crop of poppies next year.

Mr. LEVER. Do you ask for any increase?

Mr. GALLOWAY. No increase on that line at all.

The CHAIRMAN. You have been carrying on this work for several years now. What commercial results can you report?

Mr. GALLOWAY. In certain lines of the work, like that with camphor, the ultimate success of the industry is assured.

The CHAIRMAN. Aside from the camphor. That I understand has not become a commercial proposition as yet.

Mr. GALLOWAY. In South Carolina we are growing several drug plants commercially, such as capsicum and senna, which are being put on the market. Although these are in the line of demonstration, farmers have taken them up and are growing considerable areas of them.

The CHAIRMAN. That is what I wanted to get at—whether or not you are doing anything more than growing test crops; whether the farmers are taking them up and looking on them as a regular source of income.

Mr. GALLOWAY. Yes; we have farmers in South Carolina and other States who have taken these up as incidental to other crops, and that is the main line we are working upon, not to introduce these crops for one man or one class, but as incidental in connection with other crops.

Mr. LEVER. What success have you had with your peppers?

Mr. GALLOWAY. We have been very successful. Those gentlemen who have grown them have found a market for them.

We are also conducting investigations of the plants that are poisonous to man and to animals, and the special work we have been engaged upon in the past year has had for its object the determination of the cause of the so-called loco poisoning of stock. Loco had been investigated a great many times and by various people, and at various times by the Department and by others outside of the Department. Numerous theories had been advanced as to the cause of the disease, and we were never able to successfully find a cause until the past summer. We now believe we have the cause of loco poisoning well in hand, and we are conducting investigations and experiments with the view of definitely determining the method of treatment after the animal has become locoed, as well as methods of prevention. The question of prevention, however, is a very serious one on account of the wide distribution of the loco plant. The so-called loco is a species of legume that grows over a wide extent of territory in the West, and animals eating this weed or plant gradually succumb to the disease, which is a nervous trouble which is fatal. The investigations which have been made have been mainly in chemical and physiological studies of the juices of the plant, with a view of finding the active principle of loco. After this work had been gone over numerous times, Doctor Crawford began some studies with the ash of the plant—that is, what remains after the plant is burned—and he was gratified to discover that he could produce loco poisoning by the introduction of the ash into the animal by hypodermic injection or by feeding. Then the problem arose as to how to isolate the specific thing in the ash that produced these effects, and without going further into the matter I may say that he found that the cause of loco is barium, which is very abundant in the plant and must be in the soil of this western region. The plant takes up this material in a cumulative way and the animals eating the plant gradually succumb to its effects. Then, going that far, we have been able to take the barium in a pure state and produce the symptoms found in the disease, so that that matter has been rounded out.

Mr. HAWLEY. What is the annual loss of cattle, sheep, and horses from this disease?

Mr. GALLOWAY. It is pretty hard to estimate, but it will aggregate millions of dollars. We know of losses of individual herds running up into the thousands of dollars. Three or four million dollars would probably be a conservative estimate of the general loss from loco poisoning.

In our investigations we have been puzzled by the fact that we could feed loco with no effect to animals in some regions. Since we have made this discovery we find that in those regions there is no barium and that the weed does not take up any barium and is therefore free from injurious effect. We propose this coming year to continue our field studies and to map the barium-infected regions, for the information of stock raisers. So far the barium has not been found in the soil, though it is probably there, as the plant finds it. We have had field studies and clinical studies going on at Hugo, Colo., in cooperation with the State experiment station. There we had one of our experts, Doctor Marsh, during the year investigating with the idea of finding a remedy for the disease after an animal

became infected. It would not pay, of course, to take up a range animal, as a general thing, and try to cure him, but there are valuable animals that it is worth while trying to save, and it is found that the disease will succumb to a tonic treatment and slow building up of the system through tonic drugs. Strychnine is the drug that is used. Sulphates are also given to correct constipation. We have pictures here of animals that have been treated and cured, and it is the first time that I know of in the history of the disease that any animal has been cured of the disease. Here [indicating] is the loco plant, and here [indicating on map] is its distribution. This map shows the general distribution of the plant from the Canadian line to central Texas. Here [showing a photograph] is a horse that was badly locoed which was treated by Doctor Marsh and discharged, cured, not very long ago. The treatment can be very quickly effected by driving the animals through a chute and giving them this hypodermic injection quickly as they pass through.

Mr. COOK. About what quantity do you give in a hypodermic injection to a steer, say?

Mr. GALLOWAY. One-fifteenth to one-twentieth of a grain at a time. I believe a dose for a man is about one sixty-fourth of a grain. You must bring an animal out of it slowly, as he went into it. The animal becomes locoed only after eating the plant and accumulating the poison for six months or a year. We can produce acute loco poisoning in a few hours by an injection of barium into the blood, but there are no cases of acute poisoning on the range; it is all chronic, and the disease becomes evident only after the animal has been eating the poison plant for probably six or eight months. That suggested, of course, the fact that you could not expect any quick cures.

The CHAIRMAN. Has it been absolutely shown that the condition is produced only by the eating of this one plant?

Mr. GALLOWAY. There are several other closely related plants that produce loco poisoning. It may be possible that some other plants take up barium and may thus be poisonous. This year Doctor Marsh has discharged about three-fourths of his patients, cured.

Mr. HAWLEY. Has he lost any of them?

Mr. GALLOWAY. He lost about one-fourth, and that is very encouraging from the fact that nearly all used to die. When an animal was locoed that was usually the end of it.

Mr. COOK. In our State, Colorado, our legislature since 1885 has expended more than \$100,000 for the purpose of destroying the loco weed. That sum has been appropriated at different sessions of the legislature for the sole purpose of the destruction of this weed. The discovery, Mr. Chairman and gentlemen, of anything that would have a tendency to prevent the death of the animal would be of great benefit to our State or to any other State where this weed grows. It is very poisonous, indeed. So far we have been unable in our State to find a remedy. I was very much pleased when Doctor Galloway stated that they had been successful in finding a remedy.

The CHAIRMAN. What progress have your people made in exterminating the weed? You said they had spent \$100,000 in its extermination.

Mr. COOK. That weed prevails in the southern part of the State, in what are called the Mexican counties in southern Colorado, and Mexican labor has been employed for grubbing up the weed.

Mr. BEALL. What success have you had?

Mr. COOK. Very good; but it requires such a large expenditure of money.

Mr. GALLOWAY. It would be very nearly impossible, or at least impracticable, to clean up a locoed section by that process. We hope to be able to map these infected sections pretty definitely this coming year, and we hope to find some method of easily determining whether barium is in the soil. We have not found that method yet. We find no evidence of barium in the soil where the plant takes it out, and we can not determine any practical method of taking it out; but if we could find some method of doing that we could eliminate the loco poisoning; and, in fact, we have determined that there are certain sections that are entirely free from trouble for the reason that the barium is not present, or that the plants there do not take it up. We can not find it in the plants; the plants do not have it and the animals eating these plants do not have the disease. In fact, last year we fed a number of animals on an abundance of loco from those sections, and it never had any effect except a beneficial one, the animals fattening and gaining flesh all the time and with no evidence whatever of the poison.

Mr. HAWLEY. When an animal has loco once and then is cured, will it become locoed again?

Mr. GALLOWAY. That is something that we have not determined.

Mr. HAWLEY. There is no way of making them immune, or you do not know whether there is or not?

Mr. GALLOWAY. There has been no way heretofore of determining that for the reason that everything that was ever locoed died. The animals we have now will probably be tested in that direction. There is no reason to suppose that they are immune, because we have to keep them free from loco while we are treating them.

Mr. HAWLEY. Have you made any experiments with reference to seeing whether there is any way of making them immune in that section?

Mr. GALLOWAY. Yes; that is a part of the work; but it seemed hardly worth while to expend our energies in that direction until we could get some definite line on the cause of the thing; but having the cause the other conditions are made more simple.

Mr. POLLARD. These animals that have been cured; do they have their original strength and vigor, or is such an animal permanently incapacitated to any great extent?

Mr. GALLOWAY. So far as I know from the statements I have received from Doctor Marsh, which are all quite recent—all within the last six weeks—the animals are all as active and energetic as if they had never been diseased. It does not seem to have left any permanent marks.

Mr. POLLARD. Have you had much complaint from western Nebraska? I see that is within the area covered by this inquiry.

Mr. GALLOWAY. Yes; there has been a great deal of complaint from western Nebraska and some other sections, more especially from that wider territory in which that form of loco is found.

Mr. WOODS. Part of our work has been in western Nebraska in cooperation with the Nebraska station.

Mr. GALLOWAY. This last summer we were asked by the Forest Service to take up some cooperative work in the matter of aiding them

in the question of poisonous plants on the reserves. There are many plants that the people who have stock on the reserves say are poisonous. They say that their animals are dying from eating poisonous plants, and we have asked for an increase of \$5,000 to take up this work in cooperation with the Forest Service. The Forest Service is furnishing part of the help and we furnish the expert assistants and physiological chemists who will be necessary in connection with that work.

Mr. GALLOWAY. Is it necessary to say anything about tea? Do you want to ask any questions about tea?

The CHAIRMAN. I would like to know in just what way you are cooperating with Doctor Shepard?

Mr. GALLOWAY. The work that we are doing with Doctor Shepard now is along the line of increasing our knowledge of methods of handling the tea in the factory and the devising of apparatus which will simplify the manufacture of the product. We are getting from time to time new light on this subject, and the principal expense to us is the maintenance of one of our assistants at Summerville, S. C., during the tea-growing season, and he is also studying this same line of work in other fields; that is, the same man has supervision over some other lines of work going on in the same State—growing drug plants, and so on.

The CHAIRMAN. I notice that you spend on that work, or expect to spend during this current year, \$1,800. Can you give us an idea of how much the work costs Doctor Shepard?

Mr. GALLOWAY. Doctor Shepard's expenses will probably run from \$4,000 to \$5,000 a year outside of the help that he gets from us.

The CHAIRMAN. And what does he realize from the crop?

Mr. GALLOWAY. He will have this year about 15,000 pounds of tea, and that tea will net him about 40 cents a pound or \$6,000 as a rough estimate.

Mr. LEVER. Some private concerns undertake to grow this tea down there on a commercial scale; how have they succeeded?

Mr. GALLOWAY. They have been quite successful in the production of the tea. They produced last year about 12,000 pounds; I do not know what their crop is this year. We are cooperating with them only to the extent of lending them certain apparatus that we had for the manufacture of the product. The expense we have there is comparatively little, and we have an arrangement whereby we have access to their books, so that we can see the cost of production and the manner in which they are producing the product, in order that we may utilize that information.

Mr. LEVER. In your opinion, is it possible to grow tea successfully in South Carolina—or in any part of this country—in competition with foreign teas?

Mr. GALLOWAY. I think that the question of growing the tea is practically settled. We can grow it, and we can compete with the foreign product in growing it. The question of marketing it is the serious one.

Mr. HAWLEY. What about the quality of it?

Mr. GALLOWAY. The quality is fine. It is as good as any tea, practically, that we import, and Doctor Shepard has produced tea that has brought on its own merits in New York \$4 and \$5 a pound.

Mr. LEVER. The question of marketing; what do you mean by that?

Mr. GALLOWAY. I mean that the tea that comes into this country—about 98,000,000 pounds, I do not know the exact quantity—is handled in such a way that it receives its impetus through concerted advertising effort. There is a concerted effort to compete on the part of every foreigner who sends over a marketable tea; and as for the advertising of the teas in order to compete with the advertising system and systematic effort in vogue, it would just about take the cream of the profit off the growing of the tea.

Mr. LEVER. It is largely a question of the education of the American public to use its own tea; is that the idea?

Mr. GALLOWAY. Yes. Doctor Shepard has stated that if he could add 15 cents a pound to his teas the question of their advertising would be solved; that is, if he could devote 15 cents for every pound of tea to advertising, he could compete with those other people who devote about that much to theirs.

Mr. LEVER. It is rather out of your line, but have you ever considered the proposition of a bounty on American tea?

Mr. GALLOWAY. That matter has been suggested. It would mean the consideration of just how far such help would have to be given, and how long. Of course other governments, and this Government, too, have adopted that plan or policy. It would not be a precedent by any means to give a bounty on tea for a time. But that is a matter that would have to be considered very carefully before any definite statement or decision was reached.

The CHAIRMAN. How many acres are there in this plantation?

Mr. GALLOWAY. Doctor Shepard has about 100 acres, in round numbers, in his plantation, and this other plantation, to which Mr. Lever referred, has about 4,000 acres; but they have only about 60 or 75 acres in tea. Doctor Shepard has been more interested in developing types, or grades, of tea than he has in the rapid expansion of his plantation. Doctor Shepard's is fundamentally an experimental plantation; the other commercial plantation has been extending its efforts with a view to producing tea of one grade and selling it at one price—that is, black tea—not paying any attention to any of the higher-grade teas such as the oolongs or the green teas, but the efforts have been concentrated on a comparatively cheap-grade tea to put into the market and compete with the cheap oriental products. In addition to those two places, we have in Texas a very promising outlook for tea, for the reason that labor conditions there are somewhat more favorable, and I believe that the conditions so far as the marketing is concerned are more favorable. I believe that the Texas tea ought to come into bearing this coming season, and it is the plan of the owner of the plantation, to eventually extend the planting to about 300 acres. He has plenty of land and plenty of labor and plenty of money to push the thing. We are also placing with him this camphor work in the form of hedges, which he is using as wind-breaks for his tea plantation.

The CHAIRMAN. About how much will you probably expend in cooperating with Doctor Shepard this next year?

Mr. GALLOWAY. Probably not more than \$1,000 or \$1,200.

The CHAIRMAN. If you should withdraw that altogether, would it endanger the success of his enterprise?

Mr. GALLOWAY. I think it would, as regards the solving of this question of marketing, at this particular time.

The CHAIRMAN. How are you helping him to find a market; are you doing the advertising for him?

Mr. GALLOWAY. No; only indirectly. It is an advertisement for him, of course. This is a very fascinating subject with those who want to write articles, and it is always an advertisement to any concern to know that the Government has some interest in the matter and is helping, so far as its means and its policy will permit it to help; but if that were withdrawn, it might be assumed that the Government had no longer any faith in the thing.

The CHAIRMAN. On the other hand, might it not be assumed that the Government cooperation was withdrawn because the success had been demonstrated and Government help was no longer needed?

Mr. GALLOWAY. It might be so assumed.

Mr. WEEKS. Does not Doctor Shepard use the same method that any producer would use to distribute his goods; that is, the employing of wholesale grocers on a commission basis, or otherwise, to introduce his goods? I have used that Summerville tea myself, and I would buy it again if I could buy it in Washington.

Mr. GALLOWAY. I have raised that question myself a number of times. We have nothing to do with the marketing end of it. Doctor Shepard always told us that where he does get a wholesale or retail firm interested in his tea, he finds he is either undersold or underbid in some way in these markets, and his product is dropped. It is a question of quantity. If it were wholly a question of quality, I think that Doctor Shepard's tea would hold its own.

Mr. POLLARD. Doctor, do you think there is sufficient promise of the growth or building up of this industry in this country to anywhere near supply the American demand for tea?

Mr. GALLOWAY. No, sir; I do not think that the industry will ever do that, but it may be a useful industry to introduce into a region where they have few enough crops to diversify with and where it will be a means of keeping help the season through—something they sorely need.

Mr. POLLARD. Do you think the possibilities are sufficient to warrant the Government in giving a bounty or placing a tariff on tea to aid it in that way?

Mr. GALLOWAY. That is just a matter, Mr. Pollard, of personal opinion. Personally I am not a believer in bounties, but somebody else might say that a bounty was all very good. The Secretary might say that; I do not know what his opinion is about bounties. But it seems to me that if we can not make an industry go without a bounty, probably it would be better to let it alone.

Mr. POLLARD. Of course; Mr. Lever may not subscribe to that.

Mr. LEVER. Whether it is a growing industry or any other kind of an industry?

The CHAIRMAN. I have nothing further in regard to tea, and if no one else has any question, the Doctor may continue.

Mr. GALLOWAY. I may say that in this connection we have been making some rather interesting studies of some important industries. The lemon industry is a growing one in this country, and the vital matter connected with the lemon industry has to do with the proper methods of curing the fruit. The lemon must be cured and

handled very much like tobacco, tea, and hops. The question of the proper temperatures and the proper manipulation of the lemon in curing is an important one, and we have been devoting a little time to that subject.

Mr. POLLARD. Doctor, may I call your attention to that tea matter again?

Mr. GALLOWAY. Yes, sir.

Mr. POLLARD. I understood from your answer to my question that there is no possibility of extending this industry to the point of supplying the American demand for it; am I right in that?

Mr. GALLOWAY. Yes, sir.

Mr. POLLARD. There is no possibility in that direction?

Mr. GALLOWAY. No, sir; unless there is some great revolution in our labor problem; that is, unless we have very cheap labor, which we do not look forward to.

Mr. POLLARD. Unless the Government lends constant aid in some form or other the industry can not stand; it can not survive?

Mr. GALLOWAY. I am not prepared to say that yet, because, as I say, my statements are all based on the experience of one man, Doctor Shepard, and he may not have had the proper conception of advertising methods. I would like to see what Mr. Borden, a different kind of man and a different type of man, does when his crop begins to bear. Personally, I do not see any reason why he should not succeed. That is, why he should not be successful in competing with the foreign product. If he has a good thing and handles it right, I do not see why the people would not take it; that is the point.

Mr. LEVER. If the tea can be grown successfully in a commercial way in competition with foreign tea, even though we could not supply the entire American demand, we certainly could supply a part of that demand?

Mr. GALLOWAY. Oh, yes; and that is the point I made a while ago; that it will fit in with a great many industries in the South where they need variety and diversification and where it would be a continual source of income and make possible the employment of labor which is now idle.

Secretary WILSON. There is another standpoint from which you might consider it. Those cigars you have been smoking are perhaps the only cigars you get hold of that have not been doctored, have not been dipped in nasty medicine. We may be able to grow a nice tea that will not have any coloring given to it from any source. These things are to be considered. A man of an inventive mind told me one day that we were on the wrong track. He says, "You are growing your tea in bushes and picking the leaves off. You want to grow them in hedges and take a pair of horses and a moving machine and go along—set the cutting bar on an angle and go as fast as the horses can walk from one end of the hedge to the other and cut the leaves that are on that side, and then come up the other side and cut them on the other side. Have a receptacle for the leaves to fall into, and after they have grown three or four or five days, or a week, go along and cut them again, harvesting them with a pair of horses." We have not got the industry far enough along yet to get the attention of the American inventor. He will lift us out of these old-fashioned plans of growing things, just as he did with our beet-

sugar-growing machinery. We began with German machinery, German cultivators, batteries of four boilers: then threw them all away and put in one American boiler. We started cultivating with a cultivator that took two horses and two men; presently we got a Moline cultivator with which one man and one horse did the same amount of work. These are things that are attached to the development of new industries. By and by we will probably have enough American tea to give us the honest tea, the healthy, wholesome, unadulterated article. Then, again, it gives work to those little pickaninnies down there who can not do anything else, but they can pick tea. That has to be considered.

Mr. POLLARD. You think there is sufficient promise in it to warrant the Government encouraging it?

Secretary WILSON. It has been going on for some time; I think it is three or four times as large now as when it started.

Mr. POLLARD. How long have you been engaged in it?

Secretary WILSON. Pretty much since I have been here—ten years and more—we have been engaged in it.

Mr. GALLOWAY. One line of work which has not been mentioned and which is interesting in connection with this tea growing is the demonstration of the fact that the ordinary family housewife of the South could make her own tea if she had a mind to. That is, the plant can be readily grown, three or four plants will give sufficient tea for home use, and the drying is a simple matter. We have published a little Farmers' Bulletin on home tea making which illustrates the making of tea by the utilization of the home utensils, the old farina oven and the boiler and one or two other things we all know about; and the Secretary's mention of the utilization of machinery suggests the fact that at Mr. Borden's place, where we have had control of the plantings, we have put out tea in this hedge form with the idea of utilizing such machines later on. Mr. Chairman, I would like Mr. Woods to present the work under "physical laboratory," partly as a rest, and he can present it as well as I can. I mention in this connection that Mr. Woods and I work together on these things. He knows about as much about them as I do, and when I work for a while on one thing I turn it over to him, and when he gets tired I relieve him. That is the way we handle it.

**STATEMENT OF MR. ALBERT F. WOODS, ASSISTANT CHIEF,
BUREAU OF PLANT INDUSTRY, DEPARTMENT OF AGRICULTURE.**

Mr. Woods. Mr. Chairman, the physical laboratory has been developed, really, as an assistant to the laboratories requiring various kinds of apparatus to be made and to be handled, and especially in connection with our dry-land agricultural work we have had to have special apparatus to record the variations in moisture in the soil, the temperature in the soil, and the wind movement or humidity and other factors that we must know in connection with the development of our systems of cultivation in the arid and semiarid regions, as well as in recording the behavior of plants which we are testing on our dry-land agricultural farms. So Mr. Briggs's work has been almost entirely the installing and modifying of various kinds of apparatus to meet these requirements in connection with the dry-land agricultural and cereal

investigations, soil bacteriology, and all that sort of thing we are doing in all parts of the country.

The CHAIRMAN. Are not the soil survey people doing work along this same line?

Mr. WOODS. They did a few years ago; they developed such apparatus for measuring these soil conditions, but they have not been doing anything of that kind lately. We have been using some of their apparatus and adapting it for our work.

The CHAIRMAN. In this particular matter noted here on page 94 of the book, you have the second project:

The object of this work is to determine to what extent the growth of agricultural crops is controlled by the concentration and the composition of the soil solution.

They are certainly working on the soil solution at a great rate over there; I spent about a day with them and they did not talk anything but soil solution, and I wondered how far this was a duplication of it.

Mr. WOODS. It is not a duplication, because we are studying it from the standpoint of the relation of the behavior of the plant to the soil solution, and the behavior of these various bacteria. The Soils Bureau gets its soil solution by shaking the soil in water for a certain length of time and then studying the solution that they get in that way. That, for our purpose, does not represent the solution which the plant has to deal with. We have a centrifugal machine that revolves at about 4,000 revolutions a minute in which we put the sample of the soil that we have to study, in a metal box, so that the water is driven into one side, leaving the soil in the other side. That solution represents the actual solution which the plant lives on—represents the actual solution that the plant has to live upon. We find in it the bacteria that are working in the soil and the relative numbers in which they exist in the soil. So the difference between our work and theirs is that we are working with the actual solution that the plant deals with and they are working with a hypothetical solution, and while they are getting some valuable data for our work, this centrifugal machine gives the results we must have and which they do not furnish us. We have the only machine of that kind in existence.

The CHAIRMAN. How do you expect to apply the results that you get?

Mr. WOODS. We use these, for instance, in determining the rapidity of nitrification in the soil. We draw out the solution and determine the exact amount of nitrate; then we sterilize that soil and inoculate it with pure culture of the organisms we are working with. After forty-eight hours we take the solution out again and we find whether the organism introduced has increased the nitrogen present or decreased it. The same way with ammonia, and when there is an alkali soil we can determine the exact solution that the plant has to deal with in making our tests.

Mr. POLLARD. Do you not think that your work and the work of the department of soils are closely enough related so that they could be handled by one department?

Mr. WOODS. They run very closely together. Dealing with the soil, of course the Soils Bureau is bound to deal with the plant, and in dealing with the plant we are bound to deal with the soil. Of

course, we try not to duplicate, as much as possible. They are now working on the question of soil fertility, which comes very close to plant work, as fertility has very little meaning apart from the plant.

Mr. POLLARD. Are you working along that plan?

Mr. WOODS. We are working along soil fertility from the standpoint of the plant, and our bureaus in this work come very close together.

The CHAIRMAN. Is not this particular project on page 94, which you are discussing, pretty close to duplication, a pretty close parallel with the project on page 116 under the farm management investigations, where I notice that you are studying fertilizers?

Mr. WOODS. In this latter place, they are not investigating the subject, but they are studying farm practice; that is, the methods that are applied in actual farm practice, not a scientific investigation of the subject, but simply to find out what has been discovered by the farmer in his actual work.

The CHAIRMAN. Where you refer there to the study of commercial fertilizers, I thought they must vie in teaching the use of fertilizers.

Mr. WOODS. That is the practical use of commercial fertilizers by the farmer, and not the science on which their use is based. The object of this work of Mr. Briggs is largely in connection with the scientific investigation on which our practical work is finally based.

The CHAIRMAN. In regard to that electric experimentation, has there been put upon the market any machinery or formula for accelerating the growth of plants by electricity?

Mr. WOODS. Yes, but there has not been very much investment, so far, in this country. We have had a very large correspondence on the subject. In Europe, especially in Russia, a number of devices have been introduced, electrodes being put in the soil, large plates of metal through which currents of electricity are passed, and they claim that they can mature a crop of sugar beets one month earlier and that they can get a higher yield of sugar by that process; and in the Scandinavian peninsula they have used a method of stringing wires over the field, dropping points down over the crop, and running currents through the points, and they claim that that increases the earliness and the quality of the crop. Our work has been practically to test some of these various things and see whether or not there is anything in them. So far we have found nothing.

The CHAIRMAN. Have you ever investigated the claims that they make to find out whether they do what they claim?

Mr. WOODS. Yes, we have.

The CHAIRMAN. With what result?

Mr. WOODS. As far as the evidence went, it looked as though they got some result, but there were chances for error. At the time we investigated it we thought there possibly might be something in it.

Mr. POLLARD. But your investigation, your work, leads you to believe that there is not anything in it?

Mr. WOODS. I would not go quite so far as that. We have not been able to produce any material effects on our crops by the process so far.

Mr. HAWLEY. If you did affect the crop, would the increase of yield justify the expense to the producer? It must be somewhat expensive to use electricity over a large area.

Mr. WOODS. That would have to be worked out. It is a very serious question, whether it would pay. Of course, electrical currents

have a great deal to do with the various physiological processes of the plant; we know that. But so far no one has ever been able to control or find out just what electricity does to the plant. We know that the plants are traversed by electric currents all the time, but what relation they have to the physiology is not known. We have not tried to go very far into that, because we can grow big crops without it.

The CHAIRMAN. One thing I had in mind in asking the question was to get at the source of this study, whether you took it up on your initiative or whether you had an appeal from outsiders who wanted to know about it.

Mr. Woods. Well, we had reports; we had consular reports sent to us and people writing to us wanting to know whether there was anything in the electrical methods which were exploited, especially, in northern Germany and in Russia. We happened to have a man over there, Doctor Bessey, at the time, and we sent him to one of the points where they claimed to be testing this in the sugar-beet fields. He went down there and saw the fields, and there certainly was a difference in the fields. One was mature and had a large crop on it and the other one was not so good. But they might have fertilized them differently and might have had different seed. We could not get at all the factors reliably enough to determine the point, and we decided, inasmuch as a number of our stations were working on the question in the greenhouses, the Massachusetts station and the Cornell station particularly, that we ought to be in a position to say something authoritative on the relation of electricity to plant growth in the field. That is the reason we undertook it.

The CHAIRMAN. Is it not true that the fact that some of your stations were working on the problem was one reason, perhaps, why you should not undertake it. Do you not rely upon the stations for any work at all?

Mr. Woods. Oh, yes.

The CHAIRMAN. Or do you find it necessary to check them up and prove what they claim to find?

Mr. Woods. We find it is sometimes desirable to do that. We often find that our results will differ materially from theirs; sometimes they are wrong and sometimes we are.

Mr. McLAUGHLIN. Where are you carrying on these experiments, and how do you conduct them?

Mr. Woods. Here on the Arlington farm and at the laboratories. The main work has been on the farm, where we have tried running the electricity through the soil and over the crop.

Mr. McLAUGHLIN. In wires over and near to the ground?

Mr. Woods. Yes, about 3 feet over the ground. Of course, there may be some forms of current that will hasten the maturity of the plant, affect it the same as increased light does.

Mr. Cook. Your centrifugal machine, Doctor, in which you make the separation of the soil; I would like to ask whether that is done by the specific gravity of the soil?

Mr. Woods. No, it is thrown out by the centrifugal force, the machine whirls around rapidly and the water like in the cream separators, is thrown out to the outside by the centrifugal force. Dr. Briggs was formerly in the Bureau of Soils, and the development of this machine was started there; but they did not consider it was

of any use to their work, so he did not continue it. But when he came with us, we saw at once that it was very valuable for our work, and so we completed the machine and are using it right along.

Mr. McLAUGHLIN. I was going to ask you whether, when you put a wire into the ground charged with electricity, you are able to control to any extent the course of that electricity after it goes into the ground?

Mr. Woods. If you put a wire into the ground you can not; but they put in these large metal electrodes, sink them in the soil. The Russian method is to take an electrode, say 15 feet long and 3 or 4 feet wide, and sink that into the ground, and they put those 40 or 50 feet apart. Then there is a movement of electricity between those pieces of metal in the soil, through the soil, and of course that may effect certain changes of some kind in the soil; we do not know.

Mr. McLAUGHLIN. They are put in without insulation and the current is from one to another; is that the idea?

Mr. Woods. Yes, that is as I understand it. We have practically completed that electrical work and will probably spend nothing on it next year.

(Thereupon, at 4 o'clock p. m., the committee adjourned until tomorrow, Tuesday, January 21, 1908, at 10 o'clock a. m.)

TUESDAY, January 21, 1908.

AFTERNOON SESSION.

The committee met at 2 o'clock p. m., Hon. Charles F. Scott (chairman) in the chair.

STATEMENT OF MR. BEVERLY T. GALLOWAY, CHIEF OF THE BUREAU OF PLANT INDUSTRY—Continued.

Mr. GALLOWAY. Mr. Chairman, yesterday afternoon when we closed we had reached the subject of crop technology, and Mr. Woods will present that work as he had started to do when the committee adjourned yesterday.

Mr. Woods. Crop technology is rather a new line of work, as separated from the other lines, and we have combined with it the fiber-plant work, which used to be in the office of the botanist, or what we now call taxonomic investigations. We brought these two together because some of the most important problems of technology are related to the growing and handling of fibers, particularly cotton, and Mr. Dewey, who has been handling the fiber plants, has also been doing a great deal on cotton and is well posted on cotton varieties and all the facts related to the qualities and values and uses of fibers. We therefore put that work in with the work of Doctor Cobb, who is a specially expert man on technological subjects, especially on systems of grading, upon the improvement of machinery for decorticating fibers and the shelling of various sorts of nuts and cereals, where machinery is needed in order to put an industry of this kind on its feet. The work, so far as the first group of projects is concerned, the laboratory investigation and the technological study

of cereals, has been designed to help especially the next line of work—grain standardization—which we will discuss here.

The CHAIRMAN. Before you pass away from this first group, Doctor, taking it in turn and not overlooking it, I wish you would explain to us what you mean by devising various kinds of machinery and apparatus? Does that mean that you have some mechanical inventors on your staff, and keep them busy trying to improve farm machinery that is afterwards put upon the market?

Mr. WOODS. No, it is not that. For instance, when we were working cucumber diseases we found that the sprayers that were used were not well adapted to spraying cucumbers. We had to devise an apparatus by which we could spray the top and the bottom of the cucumber leaf at the same time, without injuring the vine. That involved a knowledge of the culture of the cucumber and considerable knowledge of machinery. We can not get the machinery people to do anything of that kind as a rule, and the farmers have not the time to give to it, and usually we have to suggest the changes and work out an experimental piece of apparatus that will do that work. It does not require any great amount of work. When we develop what is required, we usually describe it in a bulletin and we patent it in the name of the Department. The makers take it up and make the machines. In the same way we develop special machinery adapted to other purposes.

Mr. COCKS. In connection with the cucumber, that is for the fungous disease?

Mr. WOODS. That is the cucumber blight.

Mr. COCKS. Is it necessary to spray the under side of the foliage, too?

Mr. WOODS. It is desirable when the plant is young and on the young growth to spray both sides.

Mr. COCKS. When the plant is 2 months old, do you try to do it then?

Mr. WOODS. Not as completely as when the plants are younger, but as thoroughly as possible.

Mr. COCKS. You use the Bordeaux mixture now?

Mr. WOODS. Yes; the method is fully described and the sprayer illustrated in Farmers Bulletin 231.

Mr. COCKS. You have not found anything better for that?

Mr. WOODS. No, sir.

Mr. COCKS. We use that a great deal in my section.

Mr. WOODS. We use it also very largely in the South.

Mr. POLLARD. The chairman asked you a question in relation to subdivision three. To what extent do you carry on that work of devising and improving machinery? Do you have men who are engaged in that work generally?

Mr. WOODS. No, it is only incidental work, even in the case of Doctor Cobb, who is our best posted man in these lines.

Mr. POLLARD. What is his work? What is he supposed to do?

Mr. WOODS. He will take up anything, help any of our people along lines where they need help in the modification or adaptation of machinery to the better handling of some crop; that is, putting into operation some recommendation we find necessary in spraying, or cultivating, or pruning, or anything else that may come up. He is simply a man who has had a thorough training in plant industry

work in general, and is thoroughly acquainted with it, and he has also a knack for handling machinery.

Mr. POLLARD: The reason I asked the question is, it seems to me that that is the work that the Department ought to let alone, if they can. What I mean by that is this; it does not seem to me that it ought to be within the scope of the work of the Agricultural Department to go into the question of improving farm machinery.

Mr. WOODS. We are not attempting to do that at all. That designation given in the memorandum you refer to is too broad.

Mr. POLLARD. Will you explain to us just what occasions arise to make it necessary for you to put this man to work along that line?

Mr. GALLOWAY. If I may interrupt here, I will ask Mr. Spillman, who has had some experience in the eradication of Johnson grass, to talk to you on that. He can cite an instance in which there was no instrument adapted to that work and it was necessary to devise something.

Mr. SPILLMAN. I will say that in cooperation with a farmer in Texas, he and I together devised the machine referred to. We were trying to learn how to exterminate Johnson grass, which in the South is a very severe pest, and we came to the conclusion that one thing that was desirable, that would save a great deal of labor, would be some kind of machine by which we could rake those tremendous underground stems out of the ground after the ground had been plowed and softened up. We tried to find something that would do that kind of work, but no machine of the kind had ever been made. We found one that had been made for raking stuff off of the surface of the ground, and we asked the manufacturer to make certain changes. We gave him an order, in fact, to make some changes in that machine to fit it to our needs. The experience we had was somewhat puzzling. The manufacturer wrote us that his machine was exactly the machine we wanted, and that it did not need any modification; and that was one of the largest manufacturing concerns in the country. When I explained that it would not accomplish what we wanted, but that it would do so with certain modifications, they told me they knew more about the manufacture of farm machinery than I did, and they refused to make the modifications. What we had to do then was to buy the machinery and make the modifications ourselves, which we did, and got a machine that would work very nicely.

Mr. POLLARD. It is only in cases where there is great need for improvement, or for machinery to do a particular thing, that this work is done?

Mr. SPILLMAN. Yes, sir.

Mr. GALLOWAY. I might also cite this question, which is very acute now. One of the great problems is the growing of leguminous crops in the South, and especially the cowpea. The price of cowpeas has gone up from 75 cents to \$1 a bushel, and has continued to rise until last year the cowpea was selling for \$4.50 a bushel, making it pretty nearly prohibitive for the farmers to plant the crop, although it was seriously needed in the work of reconstructing the soils in that region. What we need in the first place is a cowpea that can be grown in bush form, and we shall soon obtain that type of plant through our plant-breeding work, for we are approaching it now; and after we get a cowpea that will grow in bush form and produce the seed in

a certain way then we want a simple machine for harvesting those seeds and for home thrashing, and when we get that we will have the farmers producing seed generally. I might cite further that when the Department of Agriculture eighteen or nineteen or twenty years ago began its first work in the treatment of plant diseases in this country, it was impossible to get anything in the way of spraying devices. Practically every one of the spraying devices on the market to-day, I think that is not too broad a statement, had its origin in some of the machines either made by the Department or suggested by the Department. The first knapsack pump that was made in this country, for instance, we had to get out the patterns for and take them around to get somebody to make the first one, and we had to do that for a couple of years before that style of pump was placed on the market; but as soon as the manufacturers became interested to the point where it seemed profitable to manufacture they began to make it, and we have now, of course, numbers of them on the market, so that now we have probably fifteen or twenty or twenty-five different forms. It is that class of work we are doing. We are not going into the question of improving wagons and carts and thrashing machines.

We are not interested in that. But we are interested in the improvement of apparatus that will meet the new and changed conditions in connection with improved crop production. We may introduce a crop that is not grown in this country at all, and we will have to have a special machine to handle it. If we had the machine to meet the conditions in respect to long-staple cottons, we could grow that cotton more extensively than it is grown, and we will do that after a while.

Mr. LAMB. The manufacturers have a machine on the market now that thrashes out this cowpea. I saw it in Virginia.

Mr. GALLOWAY. Yes, they have a machine that cuts the cowpea and thrashes and sacks it all at the same time. There are imperfections in that machine. We want to get that improved.

Secretary WILSON. Nearly every improvement in farm machinery comes from a suggestion from the farmer. The first corn planter was invented by a farmer's boy named Armstrong. I remember when the first one came around, and I saw a defect in it, and remedied it at once, and the agent came along and saw it and patented it, and the next year the machine came out with that improvement on it. We do a great deal of this work in the Department. Our people have pushed investigations along certain lines farther than they were ever pushed before. Suggestions come to them, and improvements are made, and we go and patent them for the United States, to prevent some sneak from patenting them ahead of us.

The CHAIRMAN. Nobody will complain against that, and I can easily understand how some of your men who are engaged in a particular line of work may see an opportunity to improve a machine for carrying that work forward and make a suggestion that will result in a better machine, and just as Mr. Spillman speaks of the improvement that he made in this machine for eliminating Johnson grass perhaps another man in another office of the bureau will see an opportunity to improve some other machine. But what I do not exactly understand is why there should be gathered together here under this office a project which is apparently to devote its entire time to the

devising of new machines, and a project which has grown very rapidly, if we may judge from the appropriation. I see that last year you spent \$500, and this year \$1,200, and next year you are asking for \$2,600. At that rate of increase we will have considerable of an office there after a while, apparently doing nothing but devising improvements to machinery. It seems to me that the improvements should come incidentally, as has been illustrated here.

Mr. Woods. They do, as a rule, but we are getting so many lines in which improvements are needed in connection with our work that it seems necessary to have an officer who is especially qualified along that line. He gives only a comparatively small part of his time, however, to this work. We have the devising of a pistache-shelling machine in mind—something that does not exist in this country or anywhere in the world, because in the Old World the pistache is shelled by hand. The pistache is related to the almond and is likely to be a very important crop in California and Arizona.

The CHAIRMAN. If only a part of a man's time is spent at it, why do you double the amount this year?

Mr. GALLOWAY. That man is getting his facilities and starting to work, and his work is not only on the pistache machine but other projects that other men are working on.

Mr. HAWLEY. Is that the amount of his salary only, or does that include the expenses attached to his work?

Mr. GALLOWAY. A certain portion of salary and a certain portion of expenses.

Mr. POLLARD. Do I understand that when your expert is out in a particular field such as Mr. Spillman has just suggested, and he comes to a place where it is necessary to have a new machine or an improvement on a machine that is now existent that that matter is turned over to this project, or this bureau, as you might describe it, and they take it up and work it out?

Mr. Woods. Yes in some cases, and in other cases the men themselves work it out with such suggestion as Dr. Cobb can give them. I might add to what has already been said, as a further indication of what this sort of work is, that we had to develop a tobacco seed separator in connection with our tobacco-breeding work.

Mr. GALLOWAY. And a cotton seed separator.

Mr. Woods. And a cotton seed separator, yes, for getting the light seed out. There was no machinery on the market that met our requirements for this separation and our men had to devise a machine, and they made a tobacco seed separator that can be manufactured for about \$3. Any farmer can afford to buy one or have one made. It is fully described in our bulletins.

Mr. POLLARD. Take that concrete case; would it not be just as well to let your expert who is working on that matter take that matter up? He is interested in the demonstration work in that line, or some other particular work of an expert character. Why would it not be just as well for him, in conjunction with his particular duties, to lay his plans before a manufacturer, and do it in that way rather than to maintain a bureau here whose only object seems to be to devise machines?

Mr. LAMB. He is not maintaining a bureau for that.

Mr. GALLOWAY. The whole statement we have laid before you, as I explained, is likely to be misunderstood. It is wholly and absolutely

indefinite and tentative. This statement was prepared by a clerk who took the projects at the last minute and threw them together. The broad application to farm machinery there is quite misleading. We will not use the man in that broad application at all, but in the proper field of crop technological work, as already explained, one of the chief features of which at present has to do with studies of grains, methods of working out the value of grains from the laboratory standpoint rather than the chemical standpoint, and the determination of the value of fibers, and things of that kind. We have attempted a thing here in these project abstracts that has never been attempted before in the department, and you will not find another bureau that will come up here with matters worked out in this way, with a full statement such as we have laid before you. We present the work in great detail to the end that you may examine every phase of it. You should understand, however, that we may change or eliminate a project entirely. This is not a bureau or an office; it is simply a man put there for administrative purposes, that is all.

Mr. LAMB. That is the way I understood it.

The CHAIRMAN. I think we understand that, and I do not want you to think that because we direct our questions from this book, we are sorry to have the book here.

Mr. GALLOWAY. No; we want you to have the book.

The CHAIRMAN. We are all glad to have it here. We are glad to have it, and we wish that every other bureau would do the same thing, and while we may from time to time be misled into asking questions that we would not otherwise ask, it brings out things that we would not otherwise bring out.

Mr. GALLOWAY. Of course we could have arranged our work in great groups so that you would not have anything before you except masses or groups of work upon which to base your ideas or questions, but what we wanted to give you was as complete an analysis of the work as we could, with the definite understanding that this analysis is not a final, definite proposition. We are not building a house; we are not asking for so many bricks, or attempting to divide those bricks up into so many segments, but we are giving you a living proposition that is capable of reduction or division or expansion at any time.

Mr. Woods. These projects are problems that come up to us from time to time in our work, and they are put down here, and a little may be done or nothing may be done in this or that direction for several years. If the work in a project develops enough to demand an expenditure, it goes along the line that is laid down here.

Mr. LEVER. Getting back to the proposition under discussion, let me ask this question. I make this suggestion to get my own mind clear on the matter. You send your man into the field to do a particular kind of work. He has his line of work. Take Mr. Spillman, for instance. He discovers in dealing with his ordinary line of work that a piece of machinery is needed to help along in this work. He reports that fact to you, and you report that fact to this man here that we are discussing. He improves the machinery and patents it in the name of the United States. Is that the idea?

Mr. Woods. Sometimes it is like that, but very often it is simply an improvement that the men themselves work out. This cotton separator was worked out entirely by one of the cotton men, and the tobacco

seed separator was worked out entirely by a tobacco man, and this man here in the office did not have anything to do with it. The pistache machinery is something entirely beyond the men handling the pistache. They do not know anything about pistache machines. This man has that idea in his mind and he is working it out, so that when we get a lot of pistache nuts that we want to hull we shall have a machine which can be used for the work. As Mr. Spillman says, many of these things are impossible to get in any other way.

Mr. POLLARD. This office is maintained with Doctor Cobb at the head of it?

Mr. WOODS. Dr. Cobb is considered the head of a group of projects.

Mr. POLLARD. Are they of a mechanical nature?

Mr. WOODS. No, sir; it is simply a group where mechanical ingenuity is one of the principal things required. He has the ability to help men design machinery.

Mr. GALLOWAY. Men determining the factors of grading grain are interested in a device that will enable them to quickly determine moisture. We have one machine that enables them to determine it, and Doctor Duvel and others are conferring with Doctor Cobb from time to time with the idea of getting his ideas as to the improvement of that device. Doctor Cobb does not probably devote one-fifth of his time to things of this kind. He acts simply in an advisory capacity.

Mr. POLLARD. How long has he been there?

Mr. WOODS. Only recently. He came to the Bureau last June. Before that he was working on pathology. He is a pathologist fundamentally and has done most of his work in pathology.

Mr. HAWLEY. Would your projects be seriously embarrassed in the working of them out if you did not undertake this work also?

Mr. WOODS. They certainly would. That would mean carrying it on to a place where we feel they are just going to be successful and that the farmer is going to be able to use what we work out. If we stop before reaching that point we have lost all our work and the farmer receives no benefit.

Mr. HAWLEY. Doctor Moore, of the Weather Bureau, was telling us the other day that they made some machinery they could not get elsewhere. This is on the same line, is it?

Mr. WOODS. We have to make a great deal of the apparatus we use in our investigation work, as well as that used in experimental work outside of the farm. A great deal of our laboratory apparatus has to be devised and made by our own men. For instance, we have the question of illustrations, making illustrations of diseased materials.

Mr. GALLOWAY. Cheaply and quickly.

Mr. WOODS. Cheaply and quickly, and to bring out what we want to show. The old process is to take a photograph and have a half-tone made of it, but as soon as you reduce that half-tone it does not show what you want it to show, and it is quite expensive. If you make a colored illustration and a lithograph of that, it is still more expensive. This man has worked out a method of throwing an image from a microscope on a screen, and controlling the image in such a way that any cheap man who can draw at all can copy that illustration, and he can make a better illustration for one fourth of the cost than we have ever had in any of our farmers' bulletins. We are try-

ing to get out of this habit of having to make half-tones and lithographs, and in that way we can improve and cheapen the technique of our work very greatly, and we have so many lines of work going that require this kind of knowledge that it seemed to us not only the cheapest way but the best and most effective way to handle it to have a man who had peculiar ability along that line to advise with and to help us, and in some cases to completely handle lines of work which have this element in them.

Mr. LEVER. In the matter of your cotton-seed separator, I understand it was invented and worked out by a young man from my State. This would be charged up against this department?

Mr. WOODS. No; that man had nothing to do with this cotton-seed separator. It was developed before he came in.

Mr. LEVER. But the time of this young man that did develop this cotton-seed separator would be charged against this department?

Mr. WOODS. If we had had Doctor Cobb here, he could probably have worked this out in one-half the time that it took the man who did work it out.

Mr. LEVER. From the fact that this machine was worked out by one of the department men, and patented by the Government, how much through that patent of the department have you saved the farmers in the price of that machine?

Mr. WOODS. That is hard to tell, because there is a machine on the market that is supposed to do the same thing; but it does not do it. It lacks effectiveness. It does not separate the light from the heavy seed, and the difference in the crop secured from light and heavy seed is over 15 per cent in the yield of cotton.

Mr. LEVER. This is the point I am getting at, taking Mr. Pollard's suggestion of a moment ago. Suppose Mr. Boykin had taken his plans to a manufacturer and that they worked out and put this separator in shape together and then got his patent?

Mr. WOODS. He would have had a monopoly of the machine.

Mr. LEVER. He would have had a monopoly of the machine?

Mr. WOODS. Yes; and we never do that for that reason. If we go to a manufacturer and give him a monopoly of a machine, we are at once laid open to the accusation of giving a proposition of that kind to one man when it is really the property of everybody. So before we let anybody know anything about a device, we protect it for general use.

Mr. LEVER. You say that from the fact that you can through your officials patent this farm machinery you save a great deal to the farmers of the country?

Mr. WOODS. Certainly; we prevent manufacturers from getting monopolies of these patents. Of course it is something the farmers have to have, and the makers could raise the price to anything they wanted. We believe that this man is going to be of great use to us in these and other lines, and if we did not we would never have hired him.

I started to say that in grain standardization work we need improved apparatus for quickly determining the factors that enter into the grading of the grain, and one of these points is quickly determining the flour value of wheat. This man is working on that project and is trying to devise some quick and simple apparatus or method so that it will be possible to determine in commercial affairs these factors

that enter into the grading of wheat. That is one of the principle projects he is now engaged on.

Another line of projects, and probably the principal one outside of this, will be the factors which enter into the grading of cotton. The grading of cotton is coming to be an important proposition, and one on which we are called upon to give more and more information, and we want to be ready to furnish reliable information as to the definite factors which enter into the grading of cotton.

The CHAIRMAN. Are you already working on that problem?

Mr. WOODS. We are working on that problem in a very small way, just beginning to think about it, and to think it over, and to see in what direction we can work. Cotton is now graded as grain was formerly graded, simply by an expert who looks at it and states what grade it is. You ask him why, and he does not know; he only knows it is that grade; but his judgment is based on the length of the fiber, the strength of the fiber, the amount of dirt that the cotton contains, and the luster of the fiber. All of those qualities except the last can be measured in definite figures, so that instead of depending on judgment, the grade can be determined in measurable factors, and when once determined it can not be disputed. It can be determined as absolutely as a pound of sugar or a yard of cloth.

The CHAIRMAN. Have you carried it on to the point of classifying cotton with respect to its commercial grade?

Mr. WOODS. I do not think we have authority to classify cotton, that is, commercially. We can study the factors that enter into the quality, that enter into the grade, but I do not think we could go out and classify cotton under the law.

The CHAIRMAN. You perhaps know there is a bill before this committee providing for the standardization of cotton. Do I understand that the work you are now beginning would be in the direction of that?

Mr. WOODS. It is in that direction.

The CHAIRMAN. But you do not think you could carry it to the point of standardizing?

Mr. WOODS. I do not think we are authorized by law to grade cotton, at the present time, beyond our experimental work.

Mr. GALLOWAY. The determination of the factors that enter into the grade is what we can do.

Secretary WILSON. The original act creating the Department of Agriculture gives authority to do everything that is going to be beneficial to the farmer, in the broadest sense of the term, and the only thing that is lacking is the money to do it.

The CHAIRMAN. That is a very interesting expression of opinion, Mr. Secretary. I judge from what you say, then, that in your opinion you could go ahead and establish cotton grades if there was an appropriation for that purpose.

Secretary WILSON. Yes, sir; if we are going to benefit the cotton grower by clearly outlining how grades can be established, there is no question in my mind that we have authority in the act creating the Department to do it, if you gentlemen think it is wise for us to do it. The whole thing rests with you. But the question has been raised on the floor of the House as to the authority to do this and that for the American farmer. Anything that is going to benefit the American farmer is within the jurisdiction of this committee.

The CHAIRMAN. I am glad to have that expression of opinion go into the record.

Mr. WOODS. I was referring especially to the appropriation act.

The CHAIRMAN. Yes; I understand that. You were not passing upon the broad question?

Mr. WOODS. I do not think it was intended to be included in any clause under the present appropriation act.

Mr. GALLOWAY. I would say in that connection we have a decision from the Department of Justice which substantiates exactly what the Secretary says. The concrete question came up as to whether we had the authority in handling seed to investigate and report upon seed adulterations, and the Department of Justice ruled that under that general clause the Secretary had authority to do whatsoever he pleased, and what in his judgment was beneficial to agriculture.

The CHAIRMAN. I had in mind to inquire whether you had that in mind in the work later mentioned in this abstract on cotton varieties.

Mr. WOODS. No, sir; that is in the systematic relation of the cotton varieties.

Mr. LEVER. Have you any estimate of the amount of money that would be required to put into operation the work spoken of by the chairman on the standardization of cotton?

Mr. WOODS. We have not gone into that to any great extent. The bill provides, as I understand it, for a very definite thing to be done, that is for a board to be appointed to pick out certain samples and grade them as middling cotton, and then so many grades above and so many grades below, and then send these samples to anybody who wants them at cost.

Mr. GALLOWAY. If they pay for them.

Mr. WOODS. We have not figured on what that would cost, or whether it could be done. It is still a question. We have not had the matter officially brought up.

As to this ixtle fiber, that word "ixtle" is not a familiar word to me. It is a variety that grows in Texas. Doctor Galloway explained that yesterday. But the hemp investigations and flax fiber and ramie fiber are simply textile fibers which are valuable and will make valuable industries when we find out just the best means of cultivating the plants and getting the fiber out, and the areas to which these crops are best adapted. The first one, the so-called "ixtle fiber," is especially adapted to southwest Texas, because the agave, from which this fiber is obtained, grows wild there. It is a very valuable fiber for rope, for coarse textiles, and for binding cord. The hemp investigations are very important because hemp fiber is one of our most important fibers. It was cultivated formerly in the New England States and in Pennsylvania and New York some forty or fifty years ago, but the cultivation, both south and west, fell off, and we have been trying to find out the cause of that, as this is a type of industry especially valuable in the New England States. We find that hemp can be very successfully cultivated in Pennsylvania, and that it promises to be a good rotation crop in that part of the country.

Mr. COCKS. Is that anything like the Manila hemp?

Mr. WOODS. The fibers, I believe, are similar in some respects.

Mr. COCKS. How long does it take to grow it?

Mr. WOODS. The hemp that we grow is an annual crop.

Mr. COCKS. It can not take very long to mature it in Pennsylvania.

Mr. Woods. American hemp matures well in Pennsylvania.

Mr. Cocks. Is the fiber anything like as long as that of Manila hemp?

Mr. Woods. It is very long, and a very strong and fine fiber. The Manila hemp is much coarser.

The CHAIRMAN. Do you mean to say that there is a resemblance between this hemp and the abaca of Manila?

Mr. Woods. Only in a very general way. There is no resemblance between the plants.

The CHAIRMAN. The hemp plant, you know, is a variety of the banana tree. I have seen them a foot thick.

Mr. Woods. This American hemp has a finer fiber, not quite so coarse as the Manila hemp.

In the case of ramie we have not been doing very much except to determine where the fiber can be grown. At the present time the use of ramie is very restricted. It can not be used at all commercially because there is no decorticating machine known with which to decorticate the fiber.

The CHAIRMAN. And for that reason I wondered whether it was worth while for you to spend any money on it at all. I thought it was understood that the plant could be grown here easily, and in certain quantities, and that it could be used for a great variety of purposes, provided a machine could be found that would decorticate it.

Mr. Woods. As a matter of fact there has not been any money spent on it for two or three years.

Mr. GALLOWAY. We had word about two or three days ago from a gentleman in California that he had invented a ramie decorticating machine and that he intended to make a demonstration of it on the 10th of February at Los Angeles, and he asked that one of our men be present to see the demonstration. We have a man in California, Mr. Stubenrauch, and he will be there to see that demonstration. The inventor of the machine claims that he can handle a thousand pounds of the raw material a day, and he is willing to contract with farmers for their material. This is a great crop for many sections of the country, and if the machine is a success it will open an industry that we have been looking forward to for a good many years.

Mr. Woods. It is a very valuable fiber.

Secretary WILSON. There is a new line we will have to give attention to, Mr. Chairman, if you will permit me just a word. The destruction of our pulp-making woods goes on at a tremendous rate, and there is a monopoly and the price is going higher and higher. I believe this department should make a careful investigation to see what can be made to take the place of wood for the manufacture of paper and whether the necessary plant is at hand, or whether we will have to hunt the world over for it. Paper may be made from the cornstalk or from the cotton stalk, or from some other plant we have not tried yet.

Mr. McLAUGHLIN. The marsh grass down through the South might be utilized?

Secretary WILSON. Yes; I believe it would be very advisable to have our department make inquiry into the possible sources of paper making.

The CHAIRMAN. I thought you had done that with the chemistry bureau.

Secretary WILSON. They can analyze the plant when they get one; but the growing of this plant or that, on this soil or that soil, is something they do not know anything about, and I think we ought to give a little further attention to the future supply of printing paper than we have.

Mr. POLLARD. How much do you think you ought to have?

Secretary WILSON. I do not think we want a great deal. I think we ought to make inquiry in regard to it.

Mr. WOODS. I will explain that \$1,000 of this increase was due to the fact that this matter had been brought to our attention by the Secretary some time ago, and we had intended to suspend nearly all of our fiber projects that could be suspended, and take that additional \$1,000 and put that on the question of fibers for cheap paper. Mr. Dewey has in the course of his fiber work run across grasses that seemed to have very excellent fiber and we believe that they can be used for that purpose. We propose to spend that \$1,000 requested to determine the extent to which this cheaper grass fiber for paper pulp can be utilized.

Mr. LAMB. Why do you not try these marsh grasses of the Atlantic coast here?

Mr. WOODS. One of those marsh grasses is one of the most promising things we have, and if it can be used for paper fiber it will make those marsh lands worth a great deal.

The work in the classification of cotton varieties is merely a study and record of the different varieties of cotton. It is really a systematic record of the varieties of cotton as they exist to-day. It is the basis for breeding work.

Mr. HAUGEN. Do they not raise flax out in Minnesota and that part of the country?

Mr. WOODS. The flax fiber industry formerly covered Minnesota and all the Northwest, but it was driven out of many areas on account of a disease which was in the soil, which was probably imported with flax seed from Europe. Professor Bolley, of the North Dakota station, in cooperation with us, undertook to determine that point, and found a disease-resistant strain. He has developed seed of a strain resistant to that disease, and in cooperation with the North Dakota and Minnesota stations we are breeding and improving and adapting those flaxes to the northern Mississippi and Missouri valley region. We have secured several greatly improved strains which promise to yield excellent fiber as well as seed.

Mr. HAUGEN. The binding twine made out of this fiber, what is its value as compared with that of other fibers?

Mr. WOODS. I do not know just what its relative value is. It is said to be very fine. Of course the fiber is very fine and very strong, and it makes a good twine, but as to relative values I can not say.

Mr. HAUGEN. Are they beginning to manufacture it at the present time?

Mr. WOODS. Yes; they are. They use practically all the fiber they make up there for coarse twine and coarse bagging.

Mr. HAUGEN. Did I understand you to say that this was being done?

Mr. WOODS. No; we will suspend work on that project.

Mr. HAUGEN. What I mean to ask is, are they manufacturing this twine of the flax fiber?

Mr. WOODS. Yes, sir; I intended to say also that the flax which was formerly cultivated over large areas in Iowa and in Wisconsin and in Minnesota had been discontinued on account of this disease occurring in the soil. I believe three years is considered to be the longest time flax can be successfully grown on the same land, and that is due to the disease. Now we have a resistant variety.

Mr. HAUGEN. The disease of the plant affects the fiber?

Mr. WOODS. It kills the plant. It never matures.

The CHAIRMAN. I believe our farmers say they can not grow flax but once in seven years.

Mr. WOODS. Yes; it is on account of this disease, which is very closely related to the cotton wilt.

The CHAIRMAN. You have not found anything to prevent that disease?

Mr. WOODS. Yes; we have resistant strains, strains resistant to the disease, the same as our cotton is resistant to wilt.

Mr. GALLOWAY. We will pass now to the taxonomic work, another group of projects. We have for demonstrative reasons grouped certain things under this head that are not strictly taxonomic, and the first of these has for its object the study and improvement of grazing areas in the national forests. Taxonomic means a systematic study of plants, of grasses or any other plants, for the purpose of classifying and cataloguing them or using them for the work of the department. That originally was the entire scope of the department plant investigations. It was purely an experimental work. Twenty-five years ago, when I came to Washington, they were gathering these plants from all over the country and classifying them and pigeonholing them.

The work on the grazing areas has for its object the enlightenment of the forest service people in the matter of increasing the grasses on the national forest reserves so that they will serve for the purpose for which the reserves are now being developed. Great questions arise now and then as to the proper utilization of the forest lands. These grasses are all forest species, and it is not practicable in many cases to cultivate them. We are endeavoring through a study of the habits of these plants to find some suggestions of methods of rotation or grazing methods, so as to conserve the grasses and forest plants that are already there and bring back the lands to their original value. That is the principal work we are doing, and that is done in cooperation with the forest service.

The CHAIRMAN. You have not been successful, have you, in regrassing the grazing lands that have been worn out?

Mr. GALLOWAY. Only in limited areas.

The CHAIRMAN. With wild varieties?

Mr. GALLOWAY. With wild varieties, under certain definite and rather peculiar conditions. The great question probably will have to do with the handling of the cattle themselves, with a view of grazing these lands in such a way that the original plants will return, but much can be done in regrassing and much can be done in studying the habits of these plants so as to know just when to turn the animals on. If a piece of reserve that is richly forested or grassed has certain

flora and animals are turned on it at a certain time, that flora will almost entirely disappear; but if they are turned on it at another time, the plants will recuperate, depending on their seeding habits. That problem is being worked out under different climatic conditions and under varying soil conditions?

Mr. POLLARD. Have you found any species of grass that is adapted to what is known as the sandhill areas of the Middle West?

Mr. GALLOWAY. We have no grasses that are adapted to those sandhills. Did you not do a little work in that direction, Mr. Spillman?

Mr. SPILLMAN. Yes; we used to do a good bit of work on that.

Mr. GALLOWAY. The forest service has that work now.

Mr. SPILLMAN. We formerly did a good deal of work in that direction, and there were many things that could be grown there, but it was impracticable to gather the seeds. The grasses would seed, some of them, only once in a number of years, and the seeds would drop off as soon as ripe, so that it was very difficult to gather them. If they had had the habits of our common cultivated grasses, I believe we could have sown grasses on those sandhills, but the seed would cost \$5 or \$6 a pound under the conditions under which they occurred.

Mr. GALLOWAY. As to the work in the bureau of plant industry, on the lines of systematic studies of plants, the money we had been spending in this work has been gradually turned over to other lines, and the last two or three years we have been crystallizing our efforts toward segregating that work and getting it in one place and carrying it eventually over to the National Museum, and that remark would apply to this work on the manual of American grasses and the manual of the flora of Alaska and certain other projects that I mentioned.

The CHAIRMAN. I am sure your action in that matter will meet with the approval of this committee and of the House. The sentiment here is that the department should do just as little purely systematic scientific work as it can possibly get along with, of course it being in the direction of economic administration.

Mr. GALLOWAY. We have been constantly tending toward the utilitarian side of all things. At the same time, we do not want an impression to gain weight that we must not have pure science as the basis for our work; but the purely systematic work, it seems to us, might very properly be done by the National Museum. The work of caring for and housing these dried specimens would seem to be the proper duty of that branch of the Government. The Secretary lately directed a communication to the director of the museum asking that he consider this proposition, and the director asked for a little more time. We had the matter all prepared to go in the estimates, and, in fact, already had the transfer in the estimates, but Doctor Walcott, owing to the fact that the museum building is not completed and that they had no place to put the collections, asked for another year, when they will go over to the museum and we shall be relieved of their care which is costing us from \$20,000 to \$25,000 a year. If the transfer is made the museum will take care of them, and we will establish cooperative relations.

There is one line we will have to keep, however, and that is the handling and care of purely economic collections, such as cotton and cowpeas, for instance.

Mr. GILHAMS. I want to ask you about a grass which is of great interest to the people of my country, if there is such a grass. Our people have a great many tracts of forest, second-growth timber, and they could be induced to enlarge these tracts if they could find grasses that would grow in the shade and have fattening qualities. Now, if you know of any grass that will grow in the shade and has fattening qualities, I would like to hear of it.

Mr. GALLOWAY. Mr. Spillman has been looking into that matter of grasses for the cut-over pine lands of that section.

Mr. SPILLMAN. Where the shade is very dense there does not seem to be any way of introducing a grass that will have any economic value, but where there are open woods and the land is not particularly sandy, orchard grass can be grown successfully. On cultivated land in the sandy region there are some of the clovers that can be grown, but whether they can be grown in the wild state is a question.

Mr. GILHAMS. Will not the ordinary Kentucky bluegrass grow under such conditions?

Mr. SPILLMAN. It does not like too much shade. In the southern part of this range of country bluegrass likes shade, but not in the northern part, and it does not do particularly well in the southern regions, especially where the soil is sandy. On a clay soil it will grow in the woods. There is one other grass, by the way, that will grow on sandy soil in open woods, that is very good, indeed, and that is the Canadian bluegrass.

Mr. LAMB. Will not the Japanese clover grow there?

Mr. SPILLMAN. No; it is too far north for that.

Mr. McLAUGHLIN. You spoke of this work on the cut-over pine lands. What have you been doing on that, and where?

Mr. SPILLMAN. We have been working in Michigan, Wisconsin, Minnesota, and on similar places in Maine.

Mr. GILHAMS. I understand of course that bluegrass, or June grass, as we call it in our country, will grow fairly well in shaded places, but I understand that shaded grasses lack fattening qualities, and that is why I asked if you knew of any grasses that would grow in shady places and have fattening qualities.

Mr. GALLOWAY. Take the Kentucky bluegrass in the northern country, of which it is a native, and you can grow the bluegrass, but it does not have the fattening qualities that it does out in the open, and we have no grasses that I know of that will meet those conditions; but there are certain crops that could be utilized until you get those grasses in there.

The CHAIRMAN. How about the vetches?

Mr. SPILLMAN. The only difficulty with the vetch is the high price of its seed. It is a very nutritious plant. How it would do in the shade I do not know.

The CHAIRMAN. What is the nature of vetch?

Mr. SPILLMAN. It is very much like a pea; about half way between a pea and a clover, and it belongs to the same family as the pea and the clover.

Mr. GALLOWAY. It has proved a very valuable thing for the south, especially the sand vetch, and it is grown as a winter forage crop in connection with oats, and has also proved a very effective forage crop for this section of the country in connection with oats.

Mr. HAWLEY. It does very well on the coast.

Mr. GALLOWAY. Yes, sir.

Mr. SPILLMAN. That is where we get our seed.

Mr. GALLOWAY. If there is nothing further on this line, I will pass to the farm management work, and if there is no objection I should like to have Mr. Spillman present what he is doing along the lines of farm management, and where he is doing his work, and why he is doing his work.

The CHAIRMAN. We would be very glad to hear from Mr. Spillman.

STATEMENT OF W. J. SPILLMAN.

Mr. SPILLMAN. There are four distinct lines of work in the present office which we call "Farm Management Investigations." One line of work we have no very good name for, and we call it our farm management investigations by districts; the second line is one which we call the study of farm practice; the third line is our cactus investigation, and the fourth line is the study of the application of business system in farming. I will take up those four lines briefly, and outline the nature of the work in each. First, the farm management work proper. We have the country divided into districts with one man in each district. It will take about fifteen of these districts to cover the country, and we now have about eight men in districts already organized, and are looking to you gentlemen to help us to put men in the other districts. The nature of the work of these men, whom we call district leaders, can be described generally in this way. They are studying types of farming that prevail in their respective districts, the adaptability of these types of farming to the district, and sometimes that study becomes of great importance. Take, for instance, our districts which are in the cotton belt of the South. The prevailing type of farming—not the universal, but the prevailing type of farming—is growing cotton, year after year, usually on about two-thirds of the land, and corn on the other third. Now, that is a system of farming which has exhausted the humus of the soil, has brought production down to a low standard, and has made it necessary for the farmers in some of the States to spend one-tenth of their income from crops for fertilizers. It is a question of tremendous economic importance for that section of the country to determine what other types of farming are practicable in that district. Will it be possible to introduce or to carry on in the cotton belt those types of farming which build up or maintain the fertility of the soil? These men are trying to determine questions of that kind.

Another very interesting problem of the same character is to be found in eastern Oregon, eastern Washington, and northern Idaho, a great wheat-growing region. We have one man who has charge of the district consisting of the three States mentioned. In the upper Columbia River basin farmers grow wheat as they grow cotton in the South. They have been growing wheat now for about forty years in that section, and they grow a crop of wheat one year, and summer fallow it the next year. Then in the fall they sow wheat on it. That is almost the universal system of farming. I think I can say it is more nearly universal than cotton growing in the South. We know well from the experience in two other sections of the United States which have followed this same system of farming that those people have from ten to twenty more years of that type of farming when it

will become absolutely necessary for them to change. The yield of wheat will undoubtedly, judging by experience in other parts of the country, drop to a point where wheat growing will not be profitable under those conditions. The question arises what other types of farming are possible in that section, and on the solution of that question depends whether that country will be inhabited fifty years from now or not, a country that has in past years produced forty bushels of wheat to the acre over large areas. Mr. Hunter, the man in charge of our work of that type in that section, has given a careful study to the systems of farming which are being experimented with by different farmers, and he is beginning to gather information which we believe will be of importance in the future of the agriculture of that section.

In these investigations we pay particular attention to those farmers who have made unusual successes in their work. We find a few farmers everywhere who have made phenomenal successes, and they are the men to whom we go to school. When we find a man who is making \$50 or \$100 an acre profit on his land—and we find a good many such men—we stay with that man until we learn what he knows. We study particularly the rotation of crops that those men use, their methods of plowing and manuring the land, and all of the methods used on farms of that character, and I must say that we have learned more in that study than by any other method of investigation with which I have ever had anything to do. One result of that study was to show us that there are scientific principles involved in the proper management of farms, principles which we did not suspect existed before. We would study here a man who was following a certain type of farming and making a great success of it. Hundreds of miles away another man, working independently of this first man, was making a great success, and there were others elsewhere. After studying a large number of those men we began to see that there were certain things in common among them. There were certain principles that they thoroughly recognized and utilized in the work. Now we have begun to formulate those principles. We are called upon almost daily, and sometimes many times a day, to give advice to men who are not making expenses on the farm, and especially to men in the city who are going to the country.

There is at the present time a strong current running from the city to the country, and we are getting letters from men of that kind all the time. They try us a good deal. I think you will pardon me if I give you the substance of one of those letters. They appeal to us strongly. Here is a young man who writes this way:

I am 32 years old. I am employed in a large steel works in the city of Pittsburgh. I have saved \$2,000 from my salary. I get \$1,000 a year. I have a wife and mother and sister dependent on me. I am not afraid of work. I am here in a subordinate position and I do not know what day I may be called upon to give up that position to someone who may want it. I want to go to the country where I can be my own boss and know when I quit work at night that I am not going to be discharged. Do you think it would be wise for me to attempt to transfer myself to the country, and if so what advice have you to offer?

That man had already bargained for 80 acres of land up in the State of New York, and he wanted advice about what crops to grow on that land, and how to manage that farm. We want to get in position to be able to send to men of that kind literature that will answer

the questions that are in their minds. Now, we have been working on that matter of a cropping system, especially on dairy farms. Here is a man who has 20 acres of soil. He can not afford to experiment.

Mr. COCKS. What answer did you give this fellow in the steel works?

Mr. SPILLMAN. Well, I wrote him a long letter. I told him this, that whether he would succeed depended wholly on himself; that most men would need to have a year or two of practical experience before attempting to do what he contemplated doing; that here and there there would be an occasional man who happened to have a genius for that kind of work who would make a success of it without previous experience. I told him, however, that if he had the grit, and if the people dependent on him had the grit to stand the trials of the early experience, if he would study the literature available and work as I believed he would work from the tone of his letters, he would have a fair chance to succeed. That is about what I told him, and then I made some suggestions about what type of farming he should take up, and what to grow.

Mr. COCKS. I would be interested in that. I am a farmer myself.

Mr. SPILLMAN. Oh, if I were to give you all the correspondence between that man and myself—

Mr. COCKS. No; just give it to us briefly.

Mr. SPILLMAN. Well, I presented a list of the different types of farming and told him something about the amount of labor required in the different types of farming, and something of the income he could expect from one man's labor in the different types of farming, and how soon he could expect to begin to receive a revenue from these different types of farming. After consideration he decided that dairying was the kind of farming he wanted to do, and then I advised him what kind of crops to grow, and how many cows to keep. He was in a section where dairying was all right.

Mr. HAUGEN. Does it require any scientific research to give the information which you have indicated here? That information could have been given by any farm journal, could it not?

Mr. SPILLMAN. I do not know any farm journal that attempts to give information of that kind.

Mr. HAUGEN. I have seen questions of that kind answered constantly.

Mr. SPILLMAN. They do give certain information. There are certain journals that would advise a man in their own territory about the type of farming to follow, and what crops to grow; but here is something that I do not know any journal that would advise a man about, how many cows can a man keep on 20 acres of land, and what crops should he grow, and how many acres of each crop should that man grow on that farm. I do not know of any farm journal in America that will attempt to answer such questions.

Mr. HAUGEN. You ask one hundred men that question, and you will get one hundred different answers.

Mr. SPILLMAN. Yes; you will, because they do not know the principles involved in answering that question. But you ask that question one hundred different times in our office, and you will get the same answer every time.

Mr. HAUGEN. Yes; because the same man answers it?

Mr. SPILLMAN. No; we have twenty-three men there, and you can ask that question of any one of the twenty-three entirely independently, and every one of them will give you the same answer, because we have worked out the principles. To make a long story short, I will say that after several years' hard work on that subject we have a simple little formula in which we can substitute the yields obtained on a farm, and figure out the number of cows to be kept, and the exact acreage of each crop to be grown.

Mr. HAWLEY. How did that young man do on that farm?

Mr. SPILLMAN. He is doing very nicely. The first year he got very much discouraged, and he got nearly out of money before the income began to equal the outgo, but he is getting along nicely now and he is glad he made the change.

Mr. HAUGEN. Do I understand that you can give information absolutely reliable which will enable a man to go ahead and farm and that you can figure out for him in advance the profits there will be?

Mr. SPILLMAN. No, sir; but here is a man who has, say, 60 acres of land. He knows about what yields he can get on that 60 acres. I can figure out for that man how many cows he can keep on that land and tell him how many acres of each crop to grow, and we are doing that every day.

Mr. HAUGEN. In our country it depends upon the rainfall.

Mr. SPILLMAN. Yes; it depends upon the average yield. The farmer is more subject to climatic conditions than a man in almost any other business. Suppose that the average yield of hay on a given farm is two tons to the acre. The farmer knows that his yield will be some years one ton and some years three tons, and the farmer must determine for himself whether he will keep animals enough to consume one ton, two tons, or three tons to the acre. If he keeps animals enough to consume two tons, he will sometimes have to buy hay, and sometimes have hay to sell. If he keeps animals enough to consume three tons, he will have to buy hay nearly every year. Take Mr. Chester of Champagne, Ill., one of the good farmers of the country. This is the way he expresses it. He says:

I take chances on keeping all the stock I can feed, and perhaps a little more than I can feed, because I can afford to buy a little grain and a little hay, if necessary, because it will make a lot of manure to put on my land.

Here is another farmer who says:

I do not want to have to buy any feed. I would rather have a little surplus to sell.

When we go to figure for a man, we get his own idea of that matter, and then see how it will figure out.

Mr. COCKS. Is it generally figured out that a man should raise everything he feeds his cattle?

Mr. SPILLMAN. No; that depends upon the price of mill products. There are certain sections of the country in which we would advise a man to grow everything he needs on the farm, and there are other sections where we would advise him to grow hay and buy his grain.

Here is another situation that is coming up that is modifying farm practice very markedly. Certain by-products, linseed meal and cotton-seed meal, have risen in price so much in recent years that it is now a question with the New England farmer who has always bought his grain whether he can afford to buy grain or whether he must

raise the grain, and this year the dairy farmer in New England is losing money because he is paying thirty-two dollars a ton for his grain, and for a while he was paying twenty-five dollars a ton for hay, because he had a very short crop this last fall. Hay is cheaper there now.

Mr. HAWLEY. Out in our section we feed beets.

Mr. SPILLMAN. Yes; they have out there what they call the golden tankard; that is it?

Mr. HAWLEY. Yes.

Mr. SPILLMAN. That is grown a good deal out there.

Mr. HAWLEY. That keeps hogs in good condition and keeps cows in good condition.

Mr. SPILLMAN. Yes; it is very good feed.

Mr. HAWLEY. Do they not grow that here?

Mr. SPILLMAN. Yes. In Wisconsin I know one farmer that makes a specialty of growing roots for his cattle to eat.

Mr. COCKS. Have you estimates on the use of that?

Mr. SPILLMAN. Yes; they take the place of about half of the hay.

Mr. HAWLEY. All the farmers in my country who make any money are large buyers of grain.

Mr. SPILLMAN. Nearly always. But go to eastern Kansas and you will find the dairy farmer there raising his own grain, because he can raise alfalfa hay, and corn; those are all he will need. He will have plenty for his cows, and he can raise that, and yet in that country very excellent corn can be bought cheap. These questions are determined by considerations in regard to labor rather than anything else. Here is a dairy farmer up here in Maryland who has 360 acres of land, and he keeps only 50 cows. He could easily keep 150 cows, and I asked him why he did not. He said, "I can't get the help. If I could get the labor at a reasonable price, I could treble the income of my farm, but I can't do it." Very frequently, then, whether a man shall grow his grain or shall buy his grain depends upon whether he can get labor enough to milk the cows that he could keep if he bought his grain.

Mr. HAWLEY. Did you advise him to buy a milking machine?

Mr. SPILLMAN. There is another division in our department to which we always refer questions of that kind.

Mr. COCKS. There is only one successful milking machine, and that is the calf.

Mr. HAUGEN. That work you are referring to is being followed by the experiment stations?

Mr. SPILLMAN. No; the experiment stations are not doing work of that kind. I refer to the study of systems of farming which prevail in the country. The experiment stations confine their work generally to experiments.

Mr. HAUGEN. I understand that you do not approve of summer-fallowing?

Mr. SPILLMAN. I do not take that position. If you want me to answer questions of that kind, I can give you my opinion on it.

Mr. HAUGEN. I am very much interested in it, because I have been summer-fallowing for twenty years. I am surprised to find that it was not a success, and I would like to know something about it.

Mr. SPILLMAN. It is a success.

Mr. HAUGEN. In my part of the country, where I have been summer-fallowing, I always get about 10 bushels to the acre more with the summer-fallowing than with anything else.

Mr. SPILLMAN. They do, out there in the State of Washington. But perhaps you misunderstood my position?

Mr. HAUGEN. I am simply asking for information.

Mr. SPILLMAN. I can not speak about the method in your State, Mr. Haugen.

Mr. HAUGEN. Well, what of North Dakota, Minnesota, and Iowa?

Mr. SPILLMAN. I can speak, I think, with some degree of authority on Oregon, Washington, and Idaho, because I farmed in that country seven years myself. In that country by summer-fallowing the land under present conditions they get, I should say, a 10 per cent increase in their yield, and it pays to summer-fallow, provided it is done right. But here is the important point: We know positively that that method of fallowing will wear out the soil and that it can not be kept up indefinitely.

Mr. HAUGEN. That is very valuable information.

Mr. SPILLMAN. We know that. I could give you many details, but it would take me too long.

Mr. HAUGEN. You have carefully investigated that?

Mr. SPILLMAN. Yes; we have investigated that question, and we are ready to state that we are positive that that system of farming can not continue indefinitely. We know of no case where it has ever continued more than sixty years.

Mr. HAWLEY. I would like to make a remark. In the section of Oregon where I live they used to summer-fallow. They would have a crop two years and summer-fallow the third. Now I believe they have almost universally abandoned summer-fallowing. They get a good crop of hay and fertilize the land and by this system they get a better crop than by summer-fallowing.

Mr. SPILLMAN. Yes.

Mr. GILHAMS. In our country the farmers have farmed by summer-fallowing until they have just turned the soil into a condition where it will hardly support any crop.

Mr. SPILLMAN. What part of the country is that?

Mr. GILHAMS. Northeastern Indiana.

Mr. SPILLMAN. I did not know they had been using summer-fallowing there; that is interesting.

Mr. GILHAMS. Oh, yes; from the time that I was little until I was 30 years old.

Mr. SPILLMAN. I will just take the illustration which Mr. Hawley suggests. I lived in his district for some years, in the Willamette Valley. The Willamette Valley was settled about 1843. They found it was a wonderful wheat country. I have known of 60 bushels to the acre being produced there in the early days. They adopted the summer-fallowing method. First, they grew a crop of wheat. After a while they got so many weeds that they adopted the system of summer-fallowing to get rid of them. I will say that the soil originally was as rich as any soil we have ever found. That system lasted there fifty or sixty years, and the yield of wheat in the Willamette Valley got down to an average of about 8 bushels to the acre in about fifty-five years from the time they began that system. Now they have adopted an excellent system of farming in the Willamette Valley.

They are making that soil better than it was when it was new. California had the same experience. They began a little later. Two years ago last summer the average wheat crop in the Sacramento Valley was about 4 bushels to the acre.

Mr. McLAUGHLIN. What have they done that has restored the soil?

Mr. SPILLMAN. One of the principal things is the growing of vetch. By the way, Doctor Galloway spoke of the importance of vetch in our Southern States. The farmers of the Willamette Valley are growing thousands of acres of vetch.

Mr. McLAUGHLIN. Are they turning it under, then?

Mr. SPILLMAN. Sometimes. They sometimes grow vetch and turn it under, but the better thing to do, and the thing they are generally doing, is to let the cattle graze on the field and manure it.

Mr. HAWLEY. Sometimes they grow a field and then pasture it and fatten their hogs and cattle on it, and then plow it under?

Mr. SPILLMAN. That has a very wholesome effect on the soil.

Mr. POLLARD. I would like to ask a question, and that is this. I understand you to say that you send these experts into the different sections and try to get in touch with the most progressive farmers in those sections?

Mr. SPILLMAN. Yes.

Mr. POLLARD. And there you study the methods of men who have made a great success as farmers?

Mr. SPILLMAN. Yes.

Mr. POLLARD. And by that study and association with those men you evolve what you consider a system that you recommend, do you not?

Mr. SPILLMAN. Yes.

Mr. POLLARD. Then how do you introduce that? How do you get that before the people? How do you get the people to adopt your ideas?

Mr. SPILLMAN. There are a good many methods of doing that. The first thing is to get out a good, readable bulletin embodying this system.

Mr. POLLARD. Can you write a bulletin that is practical, that the farmer can understand and apply?

Mr. SPILLMAN. Let me answer that question by giving you a concrete case. The first bulletin of this particular kind we ever published from our office was a detailed description of the most wonderful farm I have ever seen. Now, we send that out only to people who ask for it. We have sent out, I should think, something over 200,000 copies of that bulletin to farmers who have asked especially for it.

Mr. GILHAMS. What is the number of the bulletin?

Mr. SPILLMAN. Farmer's Bulletin No. 242. One member of this committee sent 10,000 copies of that bulletin to his constituents. One great firm in Chicago which has a business of loaning money all over the central states printed, at their own expense, 20,000 copies of that bulletin and distributed it to the farmers to whom they loan money; and that is not the only one of such bulletins we have issued.

Mr. POLLARD. Is that the only method you have?

Mr. SPILLMAN. No; that is the beginning of the system. These men of ours, the men whom we employ in work of that kind, are all men who are very carefully chosen for their work. They write these bulletins, and we see that they are put into the hands of the men who need them. Then we take certain features of those bulletins and we write newspaper articles, in that way calling the attention of the farmers to them. And then our men speak at these farmers' meetings which are held all over the country. My office, particularly, has a good deal of that type of work to do. We let these men go there and talk to the farmers. Not long ago I was out in the country visiting and looking over the work of our man who has that work in Oregon, Washington, and Idaho, and while I was there I attended the State dairymen's association in the State of Washington and made two addresses, giving information of those things we have been finding that are adapted to that section of the country.

Mr. POLLARD. Do you have a corps of experts who participate in these farmers' institutes?

Mr. SPILLMAN. Not regularly. We do incidentally, in connection with our work. To these farmers' institutes which the various Members of Congress have in their districts, Doctor Galloway has very frequently sent a man from our office. I have taken part in two such series myself.

Mr. POLLARD. Do you find that the farmers in these various districts where you are carrying on this work are beginning to adopt the suggestions that you make?

Mr. SPILLMAN. Very noticeably. Of course there are a great many farmers who do not and a great many farmers who look upon such things as theoretical. They are men who are a little bit hard to get interested in anything new, but the farmers generally are very perceptibly beginning to improve their methods as the result of this work. I think I am within the bounds of reason when I say that one little bulletin of which we have distributed about 200,000 copies has had a marked influence on dairy farms in this country.

Mr. POLLARD. Do you do anything in the way of demonstration along that line?

Mr. SPILLMAN. We have done more or less of that kind of thing. There is a case in Georgia where the farmer is a splendid type of dairy farmer. He is a man of the type of farmer who is set up as an example. Several of us visited him and found that he was a very successful farmer and that he had a system very easy to understand; and so, in conjunction with Doctor White, who was before this committee this morning and who was the head of the agricultural college in that State, we held a farmers' meeting on this man's farm for the purpose of giving the people of that section a chance to understand what the man was doing and how he was doing it. We had out 4,000 farmers, I think, on that occasion.

The CHAIRMAN. Do you not think, Mr. Spillman, that the natural evolution of that phase of farm management will be more and more in the direction of this cooperative demonstration work?

Mr. SPILLMAN. Oh, yes, we hope so, Mr. Chairman; we hope that that will be the case. In fact, I believe that Doctor Galloway and Mr. Woods, who are really responsible for my coming here and taking up this work, had that idea originally—that we would do a great

deal of demonstration work. Really, gentlemen, I should like to be the connecting link between the scientist and the farmer. That has always been my ambition—to help the farmer put into practice on his farm the results of scientific investigation.

Mr. GILHAMS. In connection with the summer-fallowing idea, is it not a scientific law that shaded lands gain fertility and exposed or uncovered lands lose fertility?

Mr. SPILLMAN. Perhaps I might answer that broadly, yes. But it depends upon conditions. You take the land under a house, for instance. That land gains fertility, and largely for this reason; there is no rainfall there, but there is evaporation of moisture there, and that moisture which comes up from below contains mineral matter, plant food, and it is left in that surface soil. Take the house away and get the bacteria in the soil and you will find that the soil is richer than it was before. Certain plants, especially the fig tree in the South, do not thrive generally unless they get their roots under a house.

Mr. GILHAMS. It has always been my idea that shaded lands would gain fertility for the reason that I have always observed that fact. I was born and raised on a farm and have lived there for many years, and I have done lots of farm work. I have noticed that if you would throw a bunch of straw on a field in the summer months and remove it in the fall and plow up the ground where that bunch of straw was, your crop is much larger and looks stronger and is stronger, and the land had nothing but the shade of the dry straw. If you put a board on the ground it would have the same effect.

Mr. SPILLMAN. That is true, and we understand that a part of the reason for it is that ground covered with a light layer of straw or anything else never gets hard-packed, but the water comes up from below and moistens it and makes that mellow condition which is essential to a good home for plant roots; while if you leave it exposed to the sun and winds it will dry out and solidify and become close packed, which does not make a good place for the plants to grow, and the bacteria can not work in there.

Mr. WOODS. The bacteria work under the shade.

Mr. SPILLMAN. Under the shade. Really, I think the most important part of my story to this committee is this, we have started, in our farm management work here, a line of work which is not done elsewhere in the world, but the agricultural colleges are interested in this work. During the present season we have aided five of the agricultural colleges to establish courses in farm management, and they are now using as textbooks a Yearbook article which was prepared in my office and which is not yet published, but which is to be published in the forthcoming Yearbook. That Yearbook article is now being used as a textbook in typewritten form in five agricultural colleges in this country teaching farm management. We are having calls all the time for more information about how to teach this new subject of farm management.

I will not undertake to give in any detail the results obtained by these men who are carrying on our investigations by districts. I want to call attention, however, to one thing, which is only a case representing dozens of others that shows the value of the study these men are making. Out in the Willamette Valley of Oregon Mr.

Hunter found a farmer who for twenty-seven years had been growing a plant which he called "thousand-headed kale." He had a good silo on his place which he had been letting stand idle because he did not need it. He grew that for twenty-seven years before a single neighbor adopted it. Mr. Hunter came along with his expert knowledge of the place a crop can occupy on a farm, saw the tremendous importance of that crop, and wrote a bulletin on it. That is 2 years old, and as the result of that bulletin I think I am safe in saying that to-day there are 10,000 men growing that kale in western Oregon and western Washington. They are substituting it for silage. They can get four times as much nutriment per acre as they can get from silage.

Mr. McLAUGHLIN. Do they put it in the silo?

Mr. SPILLMAN. No; they leave it out in the field.

Mr. LAMB. What sort of a plant is it?

Mr. SPILLMAN. It looks like the kale that is grown in Virginia, but it is much larger. One plant will grow that large and that high [indicating], and one of those plants is a good feed for a cow.

Mr. LAMB. Would it grow in Virginia?

Mr. SPILLMAN. We are trying it there, Mr. Lamb; we are trying it all over the United States, in fact.

Mr. GILHAMS. Will it stand during the winter months?

Mr. SPILLMAN. It will there, but it would not do it in the North. You see, the winter in the Willamette Valley is like the winter in middle Tennessee.

Mr. McLAUGHLIN. Could it be cut and put away and used?

Mr. SPILLMAN. No; it is very succulent, and it is a great deal like cabbage, but instead of growing in a head it grows with its leaves spread out.

Mr. HEFLIN. Will it remain green in winter?

Mr. SPILLMAN. Oh, yes; it will stay green.

Mr. LAMB. Could you not send me a little seed so that we can grow it?

Mr. SPILLMAN. Oh, yes; we will be glad to.

So much for this work by districts. Now, we have another section of the office, which is at present the largest section, mainly because we happened to have the men who are best adapted to this part of our work, which we call the section on farm practice. A man takes a particular phase of farming and he goes out among the farmers and studies the work of the most successful men with reference to that one thing, with a view to becoming an authority on that one phase of farming. For instance, Mr. Cates is studying the methods of destroying weeds. As a result of the first six months of his work in the study of Johnson grass in the Southern States, we have been able to publish a method by which the farmer in the South can utilize Johnson grass as a hay grass, then get rid of it, and the next year grow a crop of cotton on the land, with no Johnson grass present and with not more than one or two dollars extra expense over growing cotton where there has been no Johnson grass whatever. In other words, he has practically taken that worst weed in the United States out of the realm of weeds.

Mr. POLLARD. Worse than the cocklebur?

Mr. SPILLMAN. Oh, a great deal worse.

Mr. LAMB. That ought to save Alabama.

Mr. SPILLMAN. Alabama has been growing Johnson grass until they have found its real value. I wish I could show you a picture of the house of a farmer who has been growing it as hay.

Mr. RUCKER. Can you get rid of cockleburrs that way?

Mr. SPILLMAN. Not yet, but Mr. Cates is going to tackle the cocklebur question.

The CHAIRMAN. Have you done anything in the way of destroying crab-grass?

Mr. SPILLMAN. Mr. Cates has not yet had time to do anything in the way of destroying crab-grass. In the northern tier of States beginning with Maine and extending clear to Washington, there is a grass which is called quack grass, which, in its way, is as bad a weed as Johnson grass, but it does not make so much trouble because of the different types of farming.

Mr. POLLARD. Is that the same as pigeon grass?

Mr. SPILLMAN. No; pigeon grass is different. That grass grows over the middle part of the United States. Mr. Cates has found that exactly the same practice applied in killing Johnson grass can be applied to quack-grass in the North, and a man can actually grow this pest, grow it as hay on his farm, and then get rid of it at very small expense.

Mr. HAUGEN. How do you destroy quack-grass?

Mr. SPILLMAN. The practice is simply this. It is a pest because it has a great underground growth of stems that grow sometimes as long as this table. If you allow the grass to blossom and go to seed, it will make those great underground stems. We have found that it begins to make them just a few days before beginning to blossom. Now, the plan is to cut the grass for hay just before it blossoms. If you will do that for two years you will practically have destroyed all of that underground growth and all the growth will be within an inch and a half of the surface. Then cut it for hay in June or July, immediately plow the land two inches deep, harrow it three or four times during July and August, and then plant anything you want.

Mr. LEVER. That applies to Johnson grass?

Mr. SPILLMAN. Johnson grass, exactly the same.

Mr. LEVER. It does not grow tall enough, does it?

Mr. SPILLMAN. Oh, yes.

Mr. HAUGEN. I understand you leave the grass until it is ready to blossom?

Mr. SPILLMAN. You must not let it stand any longer than blossoming time.

Mr. HAUGEN. You cut it before that?

Mr. SPILLMAN. About the time, or before.

Mr. HAUGEN. Any time?

Mr. SPILLMAN. Any time before. But the idea is this. Do not let it blossom, or do not let it go beyond blossoming time. Then, if you will follow the directions, in two years you will have all the growth within an inch of the top of the soil.

Mr. HAUGEN. I know people who cut that quack-grass the whole summer, twice a week, and have just as much quack-grass at the end.

Mr. SPILLMAN. Because they do not apply the practice right. If you apply it wrong, you have all your work to do over again; but if you never let it blossom for two years, then plow the land two

inches deep and harrow occasionally for two months you will get it in hand and you can plant anything you want.

Mr. LEVER. Does that grass enrich the land?

Mr. SPILLMAN. It does add humus to the land, and the land that needs humus would be benefited by it.

Mr. HAUGEN. Have you discovered how to destroy this Canadian thistle?

Mr. SPILLMAN. We are studying the Canadian thistle, but we have not yet learned a method for its eradication. However, we are in sight of one. There is a very serious weed that extends from Florida to Pennsylvania and westward—it is going westward now, being found at present in Ohio. That is the wild onion, or garlic, which is a ruinous thing in the wheat field and in the pasture. Early in the spring you do not dare let a cow go out in the pasture where this onion is, because it will ruin her milk. We have two men who are spending a good deal of their time digging onions and watching what is happening under the ground. We began the first of last May. We have studied the onion ever since that time and are almost ready now to announce a method that will effectually destroy the wild onion.

Mr. HAWLEY. There is a weed out in the Valley that we call *French pink*. What do you do to kill that?

Mr. SPILLMAN. That is a weed we have not yet had time to study. These things will all come in time if we please you gentlemen and you let us keep on with the work.

Mr. RUCKER. Did you ever study the poison-oak or the poison-ivy vine?

Mr. SPILLMAN. I have not directly. I have had some experience with it. Doctor Woods could tell you how to remedy the poison from it.

Mr. RUCKER. Tell us how to get rid of the vine. I do not believe there is a man living who can cure it.

Mr. WOODS. After it once gets into the system.

Mr. RUCKER. After you come in contact with it.

Mr. SPILLMAN. You can remedy it if you apply the remedy immediately after coming in contact with it.

Mr. WOODS. The poison is a volatile oil that works into the skin, and when it is on the surface you can wash it off with soap, or you can rub it off with dry sand.

Mr. RUCKER. Suppose a person does not touch the vine?

Mr. WOODS. You get the oil; it is just the same.

Mr. RUCKER. The oil is in the air?

Mr. WOODS. The same thing; yes.

Mr. RUCKER. In winter time or summer time?

Mr. WOODS. In winter time if the oil is cold it is not volatile. If you build a fire with the wood and get in the smoke, you will get it quickly enough. But when you get it into your system, the only way to do is to draw that oil out if you can, and of course you have to use substances like lead acetate or sugar of lead to draw it out. And alcohol, if you get it out quick enough and do not spread it around, is a good thing; if you put the alcohol on and do not rub it you will get rid of it.

Mr. SPILLMAN. We hope ultimately to be able to take up the more serious weeds of the country. We take up those weeds that the farm-

ers clamor about mostly and study them until we find that there is no simple method of killing them or until we find a method. One weed, known as nut-grass, which grows all over the South and pretty well into the North, we have studied sufficiently to know that there is no simple method of killing it, and we have no recommendations to make except elbow grease for killing that weed.

Another subject that we are investigating is hay and haymaking. We found when we came to investigate the subject that perhaps nine-tenths of the hay which is sold on our hay markets is much below the highest grade. There are two principal reasons for that. First, the poor methods of curing hay, spoiling the color; cutting it too ripe, and letting it lose its color; and rain, of course, would cause the grade of the hay to be lowered. Then the presence of weeds and foreign grasses in hay reduces the grade, and I think it is probably safe to say that there is a loss somewhere in the neighborhood of \$75,000,000 a year on the part of hay growers in this country because of the fact that nine-tenths of the hay is of a lower grade than it needs to be. We are, then, working on methods of curing hay and a number of other questions, like the standing of different kinds of hay on the market, with a view to being able to advise farmers as to methods of handling this crop.

Mr. LEVER. Will you tell the committee what success you have had with your alfalfa experiments in the South?

Mr. SPILLMAN. We are cooperating with men who are now experimenting with it in some sections of the South where a large acreage of alfalfa is being put in—down in Alabama and Mississippi and on the alluvial lands all over the South.

Mr. HEFLIN. In Alabama, in my town, Lafayette, there is a field of it of 4 acres, as pretty as I ever saw.

Mr. SPILLMAN. Some of the best hay land is in your State, around Selma, and that black land, running clear across the State, has turned out to be some of the best alfalfa land. On this soil alfalfa grows like a weed, almost, without any special preparation. Mr. Westgate, who has direct charge of this alfalfa work, tells me this—that, generally speaking, on fairly good land in the South, alfalfa can be grown if the farmer will take proper precautions. If it is not rich land he must make it rich, because alfalfa will not grow except on rich lands. Generally speaking though, there are some exceptions to it. When the land does not have a lot of lime in it already, it must be limed. Then it must be inoculated with the kind of germs which alfalfa requires, and then it must be sown at the right time. In the South generally, September and February are the right months to sow it. The southern farmer, by observing those four precautions, can grow alfalfa.

Mr. LEVER. Have you found any native grasses in the South that are equal in food value to the grasses of the great northwestern section, the dairy section of the Northwest?

Mr. SPILLMAN. I am a little afraid to answer a question by comparison, by saying that one grass is better than another, but I will say this, that with our present knowledge of Johnson grass and how to control it, we consider it the best hay grass which grows in America. You can grow more Johnson grass hay to the acre with less attention than you can any other grass. Next to that comes the

great timothy grass of the North. Bermuda is a splendid grass. I know farmers who are getting 4 tons of Bermuda hay to the acre.

Mr. LEVER. How does it compare as a pasture grass?

Mr. SPILLMAN. Bermuda is the best pasture grass in America.

Mr. LEVER. Is it a southern grass?

Mr. SPILLMAN. It was introduced in the South in 1811 or during the war of 1812. The embargo that was put on American shipping in 1812 resulted in the introduction of Bermuda grass.

Mr. LEVER. How far north does it grow?

Mr. SPILLMAN. It is found around Washington, D. C., occasionally; this is along its northern limit.

Mr. COCKS. Do you mean to say that is better than bluegrass pasture?

Mr. SPILLMAN. You can carry three steers per acre during the summer on the best Bermuda pastures of the South.

Mr. LEVER. From the standpoint, then, of grasses and pasturage, there is no reason why the South should not become a great cattle-growing country?

Mr. SPILLMAN. None whatever. If you were rid of the ticks down there, there is no reason why the South could not grow cattle as well as the North.

Mr. LEVER. Will that grass grow as far north as New York?

Mr. SPILLMAN. No.

Mr. LAMB. What is the difference between Bermuda grass and wire-grass?

Mr. SPILLMAN. A great many of the farmers in the South call it wire-grass. In Virginia it is considered a nuisance, because it does not grow big enough.

Mr. LAMB. We have been fighting it ever since I was born.

Mr. GILHAMS. I notice you compared the Johnson grass with timothy. Do you consider timothy a very valuable grass in quality as compared with clover and alfalfa?

Mr. SPILLMAN. That depends upon what you want it for. If you want to sell hay to a man who lives in the city and who does not know the difference in hay, then you want to grow timothy; if you want to grow hay to feed your stock on the place, grow clover.

Mr. LEVER. Clover in preference to alfalfa?

Mr. SPILLMAN. Alfalfa is a more desirable plant than clover, but harder to grow here in the East. Now, in the West, in Kansas and Nebraska, and from there on West, if I had been out there and had that section in mind, I should have said alfalfa, but here in the East that is harder to grow than clover, and clover is our safest crop here.

Mr. GILHAMS. Do you not think that alfalfa is a greater hay than timothy?

Mr. SPILLMAN. I will say that where alfalfa does well it is the finest hay crop that we have ever discovered in the world, but I was speaking of the true grasses when I spoke a while ago. Alfalfa and clover are not grasses in the botanical sense.

Mr. LEVER. You have to cultivate alfalfa in a way, do you not?

Mr. SPILLMAN. No, after you get it well established on land that it likes, you do not.

Mr. LEVER. You do not have to fertilize it from time to time?

Mr. SPILLMAN. It will do better if you fertilize it. Alfalfa grows very deep, sometimes 10 feet deep. If the soil is of the right kind,

you see, it draws its food from a great depth. I know one field of alfalfa in your State 70 years old.

The CHAIRMAN. It is not likely, is it, Doctor, that an old crop of alfalfa would get any results whatever from surface manure?

Mr. SPILLMAN. Oh, yes; it does. I know farmers who make a regular practice of manuring the fields every winter or every other winter, and it responds very nicely to it.

The CHAIRMAN. Do you think the food percolates down to the ends of the roots?

Mr. SPILLMAN. Perhaps not to the ends, but it reaches some of the roots.

The CHAIRMAN. I thought the theory of some men in your department was that plants feed only at the tip ends of the roots.

Mr. SPILLMAN. You see, the tip ends of the roots will be all through that soil, from the surface down to ten feet below. That is one advantage of the alfalfa crop—it feeds from such a mass of soil that it takes a long time to exhaust that soil.

Mr. POLLARD. I thought the alfalfa itself acted as a fertilizer?

Mr. SPILLMAN. It does. In Colorado the farmers will grow a crop of alfalfa and let it stand at least two years, and preferably three; after that they will grow from one to three crops of potatoes or sugar beets, or both, and depend on that alfalfa for all the nitrogen they need to grow those heavy-root crops, which make large demands on the nitrogen of the soil.

Mr. POLLARD. Out in our country a general opinion prevails to the effect that you ought not to pasture alfalfa.

Mr. SPILLMAN. Yes.

Mr. POLLARD. And that when you begin to pasture it, you soon kill out your stand of alfalfa. What have you to say about that?

Mr. SPILLMAN. There is some truth in that. It depends upon the kind of stock you use and upon the number you put on the field. You can pasture hogs, five or six head to the acre, without real injury to the crop. That is, your alfalfa field will stand that kind of thing for five or six years, or longer.

Mr. POLLARD. And get a fair crop of hay?

Mr. SPILLMAN. Yes; and in northern Kansas that is a regular practice.

Mr. POLLARD. Which are the harder on alfalfa, cattle or hogs?

Mr. SPILLMAN. Well, neither cattle nor hogs are very hard on the field. Horses and sheep are much harder than cattle and hogs. It is somewhat dangerous to pasture cattle or sheep, on account of bloating, but horses and hogs may be pastured; in fact, I know of no grass that furnishes such rich food—no food that is richer for hogs and horses than alfalfa.

Mr. LEVER. The committee will excuse me for so much interest in this alfalfa proposition, but I get a great many inquiries about it. You give it as your opinion, then, that you could grow alfalfa in South Carolina and Georgia?

Mr. SPILLMAN. On clay soils you can, and on alluvial soils.

Mr. LEVER. In Orangeburg, in my district, a gentleman, Mr. Gensler, is attempting to grow this alfalfa on the ordinary sandy loam.

Mr. SPILLMAN. It can be grown there, but you have to use more manure and more lime on that sandy soil; lime is one of the absolute essentials.

Mr. LEVER. I saw his crop during the year, and at the time I saw it it was yellow and looked to me as though it was going to die.

Mr. SPILLMAN. That is a very common thing. That yellowness may be due to the lack of bacteria or it may be due to the lack of lime. It was probably the result of one of those two needs, because they both produce those effects.

The CHAIRMAN. What is the reason you say it requires clay soil in the South, while in Kansas it grows best in soil that is almost wholly sandy?

Mr. SPILLMAN. The reason is this. In the Southern States, in sandy soil crab-grass likes to grow, and it will smother out alfalfa, but when you get farther north what I said does not apply. From Washington, D. C., south, however, sandy soils are extremely difficult to grow alfalfa on because crab-grass grows so well.

One other piece of our work that is of some interest is that with the cactus plant down in the Southwest. Some of you, perhaps all of you, have traveled over the roads running through the southern part of our country and have seen the great stretches of almost desert country covered with that apparently worthless shrub which we call prickly pear. A few years ago, from correspondence which came to our office, I had faith enough in the possible value of prickly pear to send a man down to see what he could learn. He found that the plant was being utilized by farmers. We put men to work on it and, to make a long story short, I will say this, that we are growing the prickly pear under cultivation and that it responds to cultivation in a remarkable way. We are getting eight times as much of it per acre under cultivation as we could without cultivation. We get enough cactus growth on one acre of land out in the region where it is too dry for agriculture to furnish all the roughage—that is, the hay or fodder—that one steer can eat in a year. In other words, we are able to grow roughage for one steer on one acre of land out in what is almost a desert.

The CHAIRMAN. Will a steer live a year on that food?

Mr. SPILLMAN. Not on the cactus alone, but we fattened a carload of steers on cactus and cotton-seed meal and sold them at a fair price. They took to the feed readily—ate enormous quantities of it—and the interesting thing is this, that the cost of fattening that carload of steers, the cost of putting fat on them, was only $3\frac{1}{2}$ cents a pound with that feed, while ordinarily in the great steer-feeding regions it costs about 8 cents a pound.

The CHAIRMAN. How do you cut and cure the prickly pear?

Mr. SPILLMAN. That is the interesting part of it. The pear, as it grows in the field, is all covered with long spines like that [indicating]; nothing can get to it except fire. We take a modified plumber's torch, which blows a little blue flame, run it up and down the plant, and burn the spines off. We then turn the cattle in and they harvest it for us. One man can burn off enough spines to feed 100 head of stock a day, and that is the only cost of harvesting and feeding. One man will harvest the crop and feed 100 head a day.

Mr. HAWLEY. So that spineless cactus is not a necessity at all?

Mr. SPILLMAN. We have 22 kinds of spineless cactus which are of no use whatever. There is one which can be used, but most of the varieties are of no use whatever, and even the mice and rats refuse to eat them. Of the 22 kinds there are 21 kinds which nothing will eat. The other spineless kind seems to be relished, but we can not grow it without going to heavy expense to protect it from the ravages of mice, rabbits, etc.

The CHAIRMAN. How do you propagate this spiny cactus?

Mr. SPILLMAN. Plow up the land as you would for corn, make furrows as you would for corn, except that they are 5 feet apart, then take the leaves of the cactus—the flat joints of the stem of the cactus—drop them every 3 feet into the furrow, and take a small plow and turn the dirt over them. That is all there is to it, and then two plowings a year will give 23 tons of cactus per acre annually.

The CHAIRMAN. How soon is it ready for the harvest after planting?

Mr. SPILLMAN. You can harvest in two years—you can harvest 40 tons to the acre at the end of the second year. The method we are using in developing this work is as follows: We are now getting the farmers to plant the cactus in large areas. One farmer planted 40 acres this last spring. The scheme is this, to plant enough so that you can harvest one-third of your cactus plants every year. The beauty of it is that after you turn your cows in and they eat the cactus it will come up again from the same roots; how many times it will do that we do not know.

The CHAIRMAN. If you let it stand for three years it is still good to eat?

Mr. SPILLMAN. It is even better than at two years old, and the beauty of it is that it is good to eat at all times of the year—like silage, on the stalk. It is there ready to feed at all times. If you do not want to feed it now, you can keep it one or two or three years and feed it then.

Mr. POLLARD. You introduced that only in the arid regions?

Mr. SPILLMAN. It grows within 40 miles of Washington, D. C. We are trying it in Florida, but we do not know what it will do; this is a new thing.

Mr. POLLARD. But it does do well in the arid regions?

Mr. SPILLMAN. Oh, yes; it grows where other crops can not be grown.

Mr. WOODS. A representative from Australia said that they had this cactus as a pest in Australia, and he said they could not get rid of it; it is too thick to chop down and they could not get anybody to chop it. We suggested this method of utilizing it. He said it would be very valuable to them, but that the trouble was that sometimes for a year at a time they would have no rainfall. Doctor Griffiths told him that while cattle were being fed on this cactus they drank practically no water, so that you could feed your cattle on cactus, if you had it, even in a drought.

Mr. SPILLMAN. The fact is, in this experiment we calculated the amount of water cattle took with cactus, and we found that they had twice as much water as they did in another experiment where we fed them on alfalfa and let them drink all they wanted.

Mr. POLLARD. Will that plant grow out there in those sand hills?

Mr. SPILLMAN. Yes; it does grow there now, but unfortunately the species there only grows about 6 inches high. We have a good species in Texas growing as high as a man's head.

The CHAIRMAN. In countries as far south as it does grow, in old Mexico, as high as this room, is it a good forage plant?

Mr. SPILLMAN. There are sections in old Mexico where the cactus plant is to the natives what the bamboo is to the Chinese, what the cotton plant is to the south, what the wheat is to eastern Washington; what they live on; they have no other crop. The fruit of the cactus is used for making cheese; we have forty or fifty pounds of cactus cheese in our office now. They make what they call cactus honey and a half a dozen other products from it.

The CHAIRMAN. The question I had in my mind was whether when it grew larger it did not get too woody and dry for food.

Mr. SPILLMAN. A very interesting thing is that those very large plants, while they do get a good deal of wood in them, are more palatable than the young plants. Cut down a plant eight feet high and let the animals begin eating it, and they begin at the butt of it. They like that better than the young, tender end. It is the young growth that is starting out in the spring, before it is full grown, that they will not eat, but an old growth, a plant 8 or 10 years old, they eat down to the base, if you let them.

Mr. POLLARD. Are you experimenting in western Kansas and Nebraska?

Mr. SPILLMAN. We are crossing those little cacti which grow there with these big cacti from Texas with the hope of engrafting on to the little one the big-growing habit of the southern one. We are doing that work now, and we hope to be able to get up in your section cacti that will grow large enough to pay, but of course we do not know yet what the result of that will be.

Mr. LAMB. Is anybody in Virginia growing it?

Mr. SPILLMAN. No one that I know of. There is some of it growing down the Potomac River, between here and the Bay.

Mr. LAMB. They do not know it down there, do they?

Mr. SPILLMAN. There are quite a number of patches down there.

I appreciate very much the courtesy of you gentlemen in listening to what I have had to say.

(Thereupon, at 4.30 o'clock p. m., the committee adjourned to meet Wednesday, January 22, 1908, at 10 o'clock a. m.)

COMMITTEE ON AGRICULTURE,
HOUSE OF REPRESENTATIVES,
Wednesday, January 22, 1908.

The committee met at 10 o'clock a. m., Hon. Charles F. Scott, (chairman), in the chair.

The CHAIRMAN. As announced yesterday evening, the committee this morning will continue its hearings on the appropriation bill by listening to what Doctor Knapp has to say. Doctor Knapp, as you perhaps all know, has been engaged for some time in the demonstration farm work which has been carried on in the hope of meeting the new conditions in the cotton states on account of the boll weevil, and we will be glad to have a report from him.

STATEMENT OF MR. S. A. KNAPP, OF BUREAU OF PLANT INDUSTRY, DEPARTMENT OF AGRICULTURE.

Mr. KNAPP. Mr. Chairman and gentlemen of the committee, my work is somewhat different in a measure, perhaps, to what you have been listening to. It was called into extensive use under emergency cotton-boll weevil conditions, in 1904. Among the several propositions made to the committee to meet the emergency, in Texas, of the boll-weevil invasion, it was suggested by the Bureau of Plant Industry of the Department of Agriculture that, inasmuch as it was possible to make a cotton crop in the presence of the boll weevil and inasmuch as it could not be exterminated by any method then known or anything even now known, the best remedy was to make a cotton crop, and I was selected to go to our people and attempt that work. The work is not so simple as it appears, because the general impression by those who have not studied it is that it is a simple thing to go and tell the farmer how to plant and how to cultivate and how to make his crop; but those who have tried and failed have found that there was something more in it. It involves two studies. One is how to reach the mass of the people. You can reach the upper stratum fairly easily, the few—I ought not to call them the upper stratum. You can reach them easily, but when you come to the masses, you are dealing with men in the South, in forty to fifty per cent of the cases, who can not read, and in more than that, with people who do not read. They have the papers, but they do not read the papers, and hence the bulletins do not have any effect on them, and we are likely to get into great error. I have spent a great deal of study in finding out how much has been accomplished by the forces of the United States, and I expect to state them before I get through.

Now, the two problems we have are, first, how to boil down these things which are absorbing the attention of such an intelligent body as this committee for a month, so that the common negro can understand them. It is very much like the old system of theology, the whole law and the prophets had to be boiled down into the ten commandments and made very plain before the common people could get at a code of morals, and we have been obliged to boil down all our mass of information and make a little code of about ten commandments, easily understood, applicable to all conditions of agriculture, all climates, so that it will not fail anywhere; and if people follow that code so easily understood that, whether men can read or write or not, they can understand it, they will be successful farmers. Now that has been our study, to do that. We have a code. We have tested it on small farms of an acre, thousands of them; we have tested it on county farms, we have tested it on farms of three or four hundred acres, and tested it on farms of six thousand acres, and we have never found it to fail. It can not fail, because it is based on the bottom principles which are readily understood if expressed in common language. That is the first study that had to be made.

It is useless to go to a farmer and say to him, as you will readily understand, "You plant this way, and you will make a crop." He will tell you, as some farmers told one of my agents at Hemstead, just north of Houston, "We do not want anybody to come from Washington to tell us how to make cotton; we were born close beside

a cotton stalk, and we know more about how to make cotton than anybody else." And that was the finality. But being a man versed in how to reach the people, and happening to be an expert cotton man, he turned to them and said, "Men, you do not know anything about cotton; you don't even know how to pick cotton." They were picking cotton. He said, "Now, there are three of you. You take a row, and I will take a row." He picked his row out before the three men did. The man looked at him and said, "Mister, I don't care where the devil you came from. You tell me anything you are a mind to, and I will believe it." He took up the work.

Another man in the same neighborhood had never kept any track of his crops. It is one of our cardinal principles to know what our crops costs and where we are making money, and where we are losing it, on a farm. This man figured out that he made \$19.50 net on an acre of cotton, on his entire farm that year, farming under out direction. I remember well when he came to our office. I saw he was greatly excited. He said, "Where is that agent of yours," and I called the agent in and he said, "There is some mistake; I never made \$19.50. I know I have made a little money, but I know I never made as much as that. Why, I can buy the farm next to me for \$15 an acre and make a bale on every acre, and if I have cleared \$19.50, why haven't I bought that?" We looked up the figures and found that he had cleared that, and he was so excited that he walked the floor, and he came to me and he said, "Do you suppose that farm will be sold before I can get home?" And he went home and bought it and farmed it the next year and cleared the crop. There he had been living beside that land for years, and would not buy it, simply because he did not know. But I am wandering.

After you have boiled down the principles into a few that you can understand and that will work everywhere and under all conditions—they must be general principles, because specific things vary according to climate and so on—when you have got the general principles down, then the question is of machinery to reach the man, and that required a good deal of study. The question was whether we should try to get college graduates in our work. As I explained in that illustration about picking cotton, if I had had a college graduate he would never have satisfied those men at all. You had to have a man who was an expert cotton picker. You have to have a man who has gone through the experience, in order to reach the average farmer and influence him at once; he must be a man who has taken a farm and worked out the problem in a measure himself, and knows exactly what he is doing, and then he says to them, "That is my experience, I can do it."

Now, we undertook to apply this to the boll weevil. There was an emergency. A small amount, \$40,000, was assigned to us to meet it. A territory about as large as four States, like New England States, was covered by the boll weevil at that time. We undertook with that small amount of money a general propaganda. There was not a man in the State of Texas who believed we could go to the people and simply tell them how to do things, or show them how to do them. They wanted some definite aid, something given to them. That we objected to. The moment you give a man something, you demoralize him. The only reform in the world, whether it is agricultural or moral, is for a man to work it out himself through his

own muscle and on his own place and in his own way, after the laying down of general principles. Hence we called meetings over the State of Texas. It had to be done immediately. The appropriation bill was signed, I think, the 27th of January, and in two weeks I had between forty and fifty traveling agents in the field. They were appointed by calling meetings of the citizens at different points, taking their recommendations, the recommendations of the best people, of men who were considered progressive farmers in their sections, men of influence and magnetism, and on their indorsement they were appointed by the Department of Agriculture to go out and reach their fellow farmers and organize them. They could not go to individuals altogether, as they must be organized by communities, by great meetings.

For twenty days I was on the train nearly every night and addressed great meetings, many of them attended by over a thousand farmers, not one believing in that plan, thinking that they ought to be given something, and we converted all of them without any difficulty and we would frequently get 100 demonstrators, or co-operators, to agree to follow our plans, and enter into a written contract to that effect, and they felt bound—the contract was written so that they would feel bound by it—and then we would go to another community; and so we organized the communities as rapidly as we could. The system, not to weary you with details—because we learned some things about making it more economic ever year—the system boiled down into about this. Local men, if you want to work the country intensively; one man for each county or possibly two counties, if they are small. The railroads gave us transportation, but by and by the good people of Texas took that away and we thought it had ruined us; but it was the best thing that ever happened to us. The farmer is taking his own team now. Some of the best farmers and some of the wealthy farmers are devoting their lives and work to go out and instruct their fellow men. They are known as men who have made money on the farm and as prosperous farmers. I have one man in Palestine who drives a \$500 span of Hamiltonians. These men pay their own expenses. As an average—some of them get a little more, because they have to cover more territory—they get \$75 a month, furnish their own teams and pay their own expenses, a round sum, and we found that that would work in all the States.

Now, we have to have that class of men. They are the men who reach the farmer and influence him to do these things. If it is the colored people then we get a colored man; and we find that these men are more influential than if they knew ten times as much about science, as they know what the farmer considers the best science in the world, and that is the science of winning out, of making a good crop and making money on the farm. They are generally men of good average education, and have knowledge of public affairs, to a certain extent.

Now, above them we have to have another class of men, men who can discuss agriculture, who can hold meetings and address audiences and interest them. There we try to get a college graduate, an agricultural college graduate, but a man who has also had eight or ten years' experience on the farm after he has left the college, so as to boil out a certain amount of material and come down to the solid

principles. Then we insist that they shall not teach anything but these ten golden rules of successful agriculture and that they shall not apply it to any experiment, that it shall be the two or three fundamental props on which that agriculture is based; in the South, cotton and corn and cowpeas.

Mr. POLLARD. May I inquire in that connection whether these lecturers you send have preached anything but cotton. Are they confined to that?

Mr. KNAPP. No, sir; they are not confined to cotton, and I will tell you why. It grew from the situation. There were communities in 1894 where one-third of the merchants had gone bankrupt, I mean communities in large sections of the cotton country, and one-half of the farms had been abandoned because of the boll weevil. They were in the sandy loam section, surrounded by timber, where the weevil can readily hibernate in the timber, in the woods. Now, the merchants had lost so much that they had refused to advance. It is principally a situation in the South. In most of the States they are getting out of it; in some of the States and in some sections of some of the States. The whole crop was made on a system of advances. The farmer went to the merchant, or to the banker, but generally to the merchant, and agreed with him on a certain amount of provisions and whatever he would need. In other words, in some cases he would give him a mortgage, and in some cases give him a note in advance to cover his supplies for himself and, if he had tenants, for his tenants. Generally the merchants would not advance to a tenant farmer direct; he must be the man who owned the farm to get these advances.

Now, the merchant had advanced and lost for four years in this particular section, and he refused to advance, and therefore there was no way but for these people to move right off of those farms. They could not starve there, and the merchants in those cotton sections would advance only on cotton. That means a good lot, because then they could not diversify. It is impossible even if they had the money, because the merchant will not extend any advance to them for the reason that it is an untried thing, and the markets are not arranged. The solution of the problem is to make that countryman so prosperous that he can take care of himself financially, and then he can differentiate to suit himself; he can diversify as he pleases. And in talking about those people, as I often say, when a man can not buy the hind end of a cow what is the use of talking about dairying? He has to have both ends to begin. He could not change his crop without the consent of the merchant, and the merchant told him how much cotton he should plant, and how much corn. That was the situation, and we had to deal with it. I am not saying whether it is good or bad, but I have fought that situation for years there, and we have overthrown it in large sections; but it was the situation, and nobody was particularly to blame for it. It just evolved from conditions that existed. With that situation the first problem was to teach them how to live off the farm, and we taught them diversification to the extent of making their own living, nothing further, no commercial diversification like Doctor Spillman teaches, but to raise the chickens and pigs and things that they must have. Prior to our work you might say almost universally the people raised cotton only and bought everything else.

Mr. POLLARD. That seems to me to be a remarkable condition. Do I understand that the people in this pest stricken country were not raising the chickens or vegetables to supply their own family tables?

Mr. KNAPP. Yes.

Mr. POLLARD. Farmers in that condition?

Mr. KNAPP. You might travel all day and not see a vegetable garden.

Mr. COCKS. In what States was that?

Mr. KNAPP. You may take all the Gulf States; start from Alabama and go to El Paso, Tex., a distance of 1,500 miles.

Mr. POLLARD. You do not mean to say that it is a custom among the farmers in that section not to raise their own vegetables and garden stuff?

Mr. KNAPP. Yes; the only astonishing thing is that you should ask me such a question.

Mr. LAMB. Right there, may I ask a question?

Mr. KNAPP. Certainly.

Mr. LAMB. What do they do with the vegetable seeds that we send down there?

Mr. KNAPP. With those seeds?

Mr. LAMB. Yes; we have been sending them out all over the country for many years.

Mr. KNAPP. They go to town people.

Mr. LAMB. Oh, I protest.

Mr. BEALL. They do what?

Mr. KNAPP. They go to the town people, largely.

Mr. BEALL. It is evident that you are not acquainted with my section of Texas.

Secretary WILSON. You are telling what the condition was when you began work there.

Mr. KNAPP. I am telling the conditions as I find them.

Mr. BEALL. I was born and raised there, and as far back as my memory goes, every man in that section of Texas raised his garden.

Mr. KNAPP. Raised what?

Mr. BEALL. Raised his garden.

Mr. HEFLIN. His own vegetables?

Mr. BEALL. His own vegetables.

Mr. KNAPP. You live in the black lands.

Mr. BEALL. Yes; on the black lands.

Mr. KNAPP. The black lands, the comparatively small, limited open prairie where the farmers are a good deal more prosperous than they are in the sandy loam lands under boll-weevil conditions. I was speaking more of the boll-weevil conditions. But, Mr. Congressman, I have taken statistics by the hundred thousand, and I believe that I speak pretty correctly. We will take the sugar planters. You could not find, as a rule, and they are the best farmers in the whole South, and I am speaking for the masses of the people—

Mr. LEVER. As a matter of fact, are you not speaking with reference to the darkies, the negroes?

Mr. KNAPP. Yes; and the poorer whites. I do not want you to think that I am talking about the best farmers. I am not speaking of them at all. I am dealing with the masses of the people.

Mr. BEALL. I am talking about a section 100 miles wide and 250 miles in length. That is a pretty good area.

Mr. KNAPP. Yes.

Mr. BEALL. I do not profess knowledge beyond that.

Mr. KNAPP. I have traveled over that section for four years, and tried to get out about the per cent. But I want to tell you that the per cent right in your section that we have found—I will not tell you because it would surprise you, and it would not do any good.

Mr. LEVER. As a matter of fact, you found the man with the big house, as they call him down there, with all these things?

Mr. KNAPP. The good farmer always made his own garden.

Mr. LEVER. You found him with his garden and his chickens and things of that kind; but you found the laborer on the plantation, the darky, the tenant, who did not have the garden and the chickens?

Mr. KNAPP. Take the Brazos bottoms; I never found any darkies there with gardens.

Mr. BEALL. I do not know anything about the Brazos bottoms.

Mr. KNAPP. That is one of the most fertile regions we have there. A man who has eight or ten farms generally lives in a little village or town, because he can reach his different farms more easily from there. He makes a garden. He is an intelligent man. But I did not mean to be drawn off into anything of this kind. I am simply saying what we canvassed and knew to be the case. There may be sections where it is different from that. I speak now of the general sections. You take the sugar planter, and as I say, excepting at the big house, there would be 700 or 800 men, and not a garden. I have canvassed a good share of the sugar planters in the South, and I have never seen any colored people make a garden or raise chickens, and I have asked them why, and they said the other negroes would steal them, and it was no use.

Mr. LEVER. They raise their chickens at night, do they not, Doctor?

Mr. KNAPP. Yes. Hence, while I speak of it as a general rule, I do not mean to say that there are not a great body of very intelligent men who farm according to the best principles, and we try to corral those men and get at them first and say, "Let us line up this lower level of 75 per cent or so."

To show that I am correct, if you will study the census, that will bear me out. For instance, take the State of South Carolina where they made 254 bushels of corn to the acre. The general average was about 10 bushels to the acre. Somebody was doing some pretty small farming, and a good lot of it, to average down that 254 bushel man; and therefore my mission being to the average man, the small farmer, and in Texas to the sandy loam farmers, the small sandy loam farmers, because they were the men that suffered the most, we found that that was the condition. They did some of them raise their own hogs, and yet there were stations where they never shipped a carload of hogs, as far as I could find out. They raised more or less chickens, these small farmers. The first year we had to supply them with seed to make their own living, so that they could live at home, and that much we taught them, and then we were obliged to tell them about corn in order to support the pigs and so on to carry out the theory. In other words, a man can not farm on one crop alone, you must rotate, and consequently you are compelled to teach the other crop with which they may rotate, and that is corn; and then to keep the lands from deteriorating we must teach the use of the cow-

pea, and that is about as far as we go, except to teach them the use of a cover crop in the winter, because those lands lying idle in the winter is a pretty serious matter. Therefore we teach them to put on oats as far as they can, because they can pasture the oats or plow them under in the spring or put a crop on them, as they see fit.

Men differ widely in opinions, and I think it is quite right that they should. I undertake, when our men go in, to get a census, in a certain sense; of how many good farmers are there, how many farmers there are following any of the general principles of good farming. And it only runs from 1 to 5 per cent. Sometimes it would be as many as 5 per cent. There is where many of our experienced men are mistaken. I have been at these farmers' institutes, and I have attended these farmers' congresses in the North and in the South, and I find that it is pretty near the same body of men coming up. They think that it is a great mass of the people that are being informed, but it is the same class of men coming up every year; and as Mr. Spillman said yesterday to you, one particular forage crop one of his neighbors had grown for twenty-four years, and no one else was growing it. Now, they do not accept it. They do not take anything new. They just do the same thing year after year, or have been doing it. Consequently it was necessary to change these men by means of a small demonstration, or I should say the few that attend these meetings. The boys grow up and to a large extent go to town, and enter into business or something else, and you can not blame them for that, because they earn more in those places. The earning capacity of the average mechanic, I mean what he produces by his own labor, is \$1,066 per annum, by the last census. I think there is but one State in the Union where the average earning capacity of the man on the farm equals that, and that is the State of Iowa. In the States of South Carolina and Alabama, and I believe Georgia, it ran less than \$160. That is the earning capacity of the State on the crops that they sell from the result of their labors, and that is the amount. If they farm on shares, they get half of it or two-thirds of it, according to the contract, and so on.

Mr. POLLARD. That is on how large a farm, do you say?

Mr. KNAPP. I did not speak of that. I am speaking of the average of every laborer that works.

The CHAIRMAN. How do you reach that average, by taking the gross returns from the products sold from the farms and dividing it by the number of laborers?

Mr. KNAPP. By the number of laborers; yes, sir. It has been very carefully worked out by your census. There are some other very interesting problems. In the States where they have a high income relatively from the farm, you will find that they use better machinery and more power, and that it is almost entirely due not to their scientific knowledge, but to the amount of power they use on the farm and the amount of machinery. In other words, a man does more work in a day. In the States where a man uses little power, he uses an 850-pound mule for two workers. That means that it is nearly all done by hand. In the States where they use the most power, they use now four large horses weighing from 1,200 to 1,500 pounds. The man rides, and he plows three or four times as much, and he accomplishes three or four times as much, and the result is that his income is greater.

There is just one other problem. In the States where they earn so little there is scarcely any farm stock. In fact, there are no fences in a great many states to amount to anything. Here and there there will be one, but as a rule the lands are not fenced, 40, 50, or 60 per cent of them; and even the 40 per cent of the land that is under cultivation is not fenced to any great extent in many States. In the other States where they have farm stock the lands are all fenced. In considering stock I throw out poultry, which is not regarded as farm stock, as I know from my own experience. I bought some once as farm stock, and they would not allow my bills here in the Department because they were not considered farm stock. Counting the pigs and the cattle, and what they sell, there are States where it amounts to very few dollars per capita, running down to \$10 per capita for the total amount they sell, while in the larger States it runs close to \$500 per capita, besides the great earnings on the farm. That is what brings the great State of Iowa to such a high measure of earning for each man.

I have digressed, gentlemen, but the object of all this is to prove to you and to prove to the people that we talk to that the foundation of success and of a higher civilization is to increase the earning capacity. First, the farmer must get out from under that merchant who determines exactly what he is to do.

Mr. POLLARD. Are the farmers succeeding pretty well everywhere you have been in accomplishing that?

Mr. KNAPP. Pretty much altogether. As a sample, so that we were not going to be deceived, we went along the Houston and Texas Central Railroad, in Limestone, Falls, and Robertson counties, and we took a section about 60 miles long where a large per cent of the farms were abandoned. We took the statistics of the number of bales of cotton produced and marketed in these counties in 1903. We went to work intensively, and kept an account. The increase in the cotton alone, some of it due to prices, but not altogether, the increase at nine stations consecutively right along that railroad, was \$3,000,000, with no more land brought into cultivation, because that is a timber country.

Mr. LAMB. You were talking about 1893 and 1894. I sold cotton for 4½ and 5 cents then, and now it is 10 and 12 cents.

Mr. KNAPP. No; 1903 and 1904, and then we took it in 1904, 1905, and 1906.

Mr. LAMB. There has been an increase in the price of cotton ever since.

Mr. KNAPP. Yes; I say it was partly due to that.

The CHAIRMAN. What years are you comparing, now, when you mention this \$3,000,000?

Mr. KNAPP. 1904, 1905, and 1906 compared with 1903. I am comparing the year before we touched the work with the three years following, and I am saying that we increased the amount of cotton about 300 per cent.

Mr. LEVER. With the average price of cotton about the same?

Mr. KNAPP. No; the price was higher.

The CHAIRMAN. The important thing, I take it, is that you increased the amount of cotton, the weight of cotton produced on the same area, about 300 per cent?

Mr. KNAPP. Yes.

The CHAIRMAN. So that we for this comparative illustration may neglect the difference in the price?

Mr. KNAPP. Yes; and on a less area, because they planted their own corn and raised their own foods; and being a timber country there was no new land brought in, so far as we know.

Mr. POLLARD. In this section where you have been at work have the farmers adopted this plan of diversified farming which you have introduced? Are they rotating their crops and planting vetch and corn along with their cotton?

Mr. KNAPP. Not vetch; they use cowpeas.

Mr. POLLARD. Cowpeas?

Mr. KNAPP. Yes.

Mr. POLLARD. Are they following your suggestions in regard to the rotation of crops?

Mr. KNAPP. Yes. I have the figures showing the per cent, but I sent all our documents up here by freight, and they have not arrived yet. But I have the proof right here from the individual farmers; I have one right here from Helena, Ark., where two demonstrations were made in two years. Just two men worked in that county. Of course we had only one man for the north part of the State. The boll weevil had not got there, and we went a little in advance. As the result of the working of those two men, the business men's league of that little place took it up, and are trying to establish this year 1,000 1-acre farms on our plan, and they are asking me to help them out with instruction and some supervision, and so on.

The CHAIRMAN. Did you not tell me the other day that in one county at least the merchants have refused to make their usual advances to any farmers who did not agree to conduct their farms according to your directions?

Mr. KNAPP. There are plenty of counties like that.

The CHAIRMAN. In what States?

Mr. KNAPP. In the State of Texas and the State of Louisiana. Take two counties. Take Harrison County, a sandy loam county. They sent for me and we called a meeting. That was in October of 1906. They raised \$1,700 in that county to aid in the work, which was mainly expended in furnishing better seed. I have not spoken of that yet, but dealing with the boll weevil requires a different cotton plant, a plant with shorter joints, and a boll which has a thick calix, and that can grow out of the way of the boll weevil quickly. Then we had to teach them how to save their seed, and care for it. They raised \$1,700, and we put a man in there at \$125 a month, and out of that he paid his own expenses, furnished his own team, and so forth. The boll weevil was so bad last year that the negroes decided to leave the farms. Among a certain class of people there is a kind of depression that will go through all. It is whispered, "We are not going to make a cotton crop." We do not know where it is, nor how to meet it. They wired for me, and I could not go, but I sent the State agent, Mr. Proctor, and he went there and talked to those negroes for five hours. There were over 500 of them. At first they were sullen. They afterwards began to listen a little, and finally at 5 o'clock in the afternoon one old darky got up, and he said, "Well, I thinks that if the President thinks enough of us poor niggers to send a white man down here to show us how to raise cotton, we ought to raise the cotton," and they

put it to a vote, and voted it. That is all that carried us through. Then they went home.

Now, not to be deceived in that matter I went there in October and called a meeting of the influential citizens of that county, farmers, business men, and I called them right up one after another and asked them, "Now, what are the facts here, on your honor?" and they told me that every colored man that went back and followed our plan was all right. Everyone of those men went back under an agreement that he should have the food for his family, whether he made a crop or not; they would trust him if he followed our plans, but if not he must get out and hustle for himself. Those that did follow our plan made a crop and paid off their debts and were happy. Those that did not had very little, unless they went to a sawmill and worked. They told me they had no fear of the boll weevil themselves, the negroes were satisfied and the white men, and I have a document here signed by six of the best citizens and certified to by the county judge, that these are the facts. I am going to leave these papers right here so that any of you can see them.

Mr. POLLARD. In Texas, where you described the situation of the farmers that abandoned their farms when the boll weevil struck the country, in 1903, in that section I understand that the farmers have returned to their farms and are operating them, and I would like to know whether you have any figures showing what per cent of the farmers of that section are following your methods.

Mr. KNAPP. I can not tell you exactly, only by the results of the work. They have nearly all adopted the kind of cotton we recommend, because we know that by the cotton that is marketed. They have nearly all, or a large per cent of them, adopted our method, or they could not raise cotton. You can not raise cotton under boll weevil conditions unless you do adopt our methods, and they are very successful in those sandy loam sections. The boll weevil has not been as bad in the black lands; they have not suffered as much there because the hibernating places for the weevil are not so easy of access. I know this section I speak of very well, and I know the people personally, and I have sent a man over to find out how they were doing, and I have a letter in my office from the State agent who personally knows nearly every man in that district and worked there individually in 1904, 1905, and 1906, and he wrote me that they were still following the plan, and that in certain places, at Brecon, right close to the station, for instance, there was an acre last year that they were showing where that land formerly raised about one-eighth of a bale—it is very light sandy land, underlaid with clay—they made in 1906 on a demonstration a bale and three-quarters, and that so changed things that the people were making some large crops there. Last year, you will mind, there were conditions in the South that might occur under any system of agriculture and which would make it a failure. For instance it was so wet right in cultivating time of the crop that in many places you could not take a team into the field for three weeks; they would bog.

Mr. BEALL. And it was cold.

Mr. KNAPP. And cold, yes; and a great many of them lost their cotton crop, and had to replant for the fourth time. That was a very depressing thing last year, and that extended through a large section of the cotton country, nearly all over Texas. Western Texas

was a little more exempt, because that is a dryer country. All eastern and northern Texas, where the great body of the cotton is raised, and all of Louisiana, the cotton centers of Louisiana and Arkansas and Mississippi and Alabama, is that way. When you strike over into the Atlantic States things differ quite a little. They have a more regular rainfall there.

Another thing we have to deal with there is extreme drought. The old method for corn was, they plowed only 3 inches deep on an average. Now, on hill lands there would come a 2-inch rain, and it would wash that off. If they would plow 10 inches deep, not throwing it up top, but stirring the soil with a disk plow, that would not be deep enough to produce this washing. Furthermore, where they plow only 3 inches it ruins the corn crop when they have a drought, because it will dry up; and we have been changing the form of the hills and depth of the plowing, and without any fertilizer we changed the crop from 14 bushels to 60 bushels an acre.

The CHAIRMAN. To what extent would that deeper plowing alleviate the conditions in the Appalachian region, where it is claimed on account of the deforestation the soil is all being washed away?

Mr. KNAPP. It would not be a substitute for the forest, by any means, but it would help; it would retain moisture in the soil.

The CHAIRMAN. To a great extent the hillside farms in that region have been destroyed because they have not been cultivated properly.

Mr. KNAPP. Shallow plowing, one crop, and no cover crop; that is what has ruined them. The remedy is more humus, which is simply a sponge to hold the water; more humus and deeper plowing. A winter cover crop will restore those hills and make them as fertile as when they commenced farming them, perhaps more so, and we have tested it, as I say, everywhere, so as not to be deceived, and the few principles that are carried to these people enabled them to revolutionize the fundamental plans of doing things, so that the common man makes money and gets out from under his load. I have a letter here from Booker Washington. The question was whether you could reach the untutored negro, and I have a letter here from Booker Washington a copy of which I will leave with you, saying it was the best civilization that ever came to the colored man.

The CHAIRMAN. In that connection it might interest the committee for me to say that I was talking with Booker Washington yesterday, and he said that they had been sending out from Tuskegee for two or three years what they call an "agricultural wagon," which carried an expert farmer, with some simple tools and machinery, and which went to the crossroads out in the country, and they talked better agriculture to the people, and he said that the result had been so encouraging that they expected in a few weeks to start a second wagon, and to keep two of them going.

Mr. KNAPP. That wagon and team were given by Maurice K. Jessup, and the man is working under our instructions and in cooperation. Now, in cooperation we oblige those men to give something. Mr. Washington out of some funds pays one-half, and we pay one-half, and as I said, one of the great problems is to change the horsepower and the tools and not to work with such little inferior tools. He takes these tools in his wagon and drives to a place and

calls together 25 farmers and shows them how to plow and lets them take their hand at plowing and see that they can do it, and the result has been marvelous, he says. I attended their fair at Tuskegee last fall, and one negro came around and he said, "Boss, I wants to show you my little demonstration," and he took me to a stall and showed a cotton stalk about 4 feet tall, well branched and full of bolls. Alongside of it was a little cotton stalk about 15 inches high, with three or four bolls on it. The large stalk showed that it would make from a bale to a bale and a half an acre, and the little stalk would make perhaps a quarter of a bale to the acre. I said, "What is this, Uncle?" He said, "This big stalk is what you tells me. I farm according to your say-so," and he says, "This little stalk I raised on the same land last year according to what I knows." He had tied them both together simply to show the results. Now, he had gotten the whole problem into his head there, and that is all he needed to know. He could not read, but he could understand the difference between the two cotton stalks when they were tied together, and when he picked the lint.

I took a gentleman from New York, a very prominent man, into a cotton field in Mississippi, and he wanted to find out whether the common people were getting the benefit of this. This was the place of a poor white family, and there was a little boy 12 years old picking cotton; his father was a drunkard, but this little boy had cultivated an acre of cotton under our charge, and this gentleman said, "My boy, which is the best cotton around here?" He said, "That is the best cotton, sir." "Can you tell me why it is the best cotton?" He said, "Yes sir. Don't you see that cotton turns right over and there is a kind of a shed over it," meaning the calix, which hung down. "This cotton has a little boll and it stands up and catches all the water when it rains, and rots. That other is storm-proof." He said: "Is there any other reason why it is the best?" "Yes sir. I can pick 150 pounds of that cotton in a day, and I can pick only 100 pounds of this cotton." The gentleman said, "Very good. Is there any other reason?" "Yes sir. That cotton brings 2 cents a pound more than this cotton. That is the best cotton." Now, those are simple demonstrations that once entering the minds of the men stay there. I have wandered a good deal, and perhaps have not said all that I should have said, but I would be glad to have you read these documents and see the grateful recognition of the communities and their willingness to raise funds and help. I want to say one word further, however, that what funds we have raised from Congress are less than half the funds we are using. The whole work of Congress has been confined, really, to the boll weevil districts, or districts just adjacent.

Mr. COOK. We do not raise cotton in our State, although in the extreme southern part a few years ago we raised a very fine grade of cotton; but being a novice, I would like to know what the boll weevil is and what effect it has on the growth of the cotton.

Mr. KNAPP. The boll weevil is simply one variety of the common weevil, the pea weevil, which has on the end of its little trunk or proboscis something like an auger, and will bore a little round hole into a pea. The boll weevil will puncture the little minature bolls of cotton—we call them squares—when they are about the size of the end of your small finger. The female weevil punctures the boll and

lays an egg in there and then turns around and closes up the hole so that you can not do anything with it, and there is just food enough in there, showing that they are a very sharp insect, to sustain that little insect until it can mature, which it will do in from fifteen to twenty-one or twenty-two days. Then it goes on, and it is said by entomologists—I have never had any time to figure out anything like that—that one pair of weevils will multiply to 134,000,000 in a year. Consequently it is just a race, under the new conditions it is just a race, and I am glad it is, between raising the plant and exterminating the moth. It is a race between Doctor Galloway and Doctor Howard. Doctor Howard is the boll weevil man, and Doctor Galloway is the plant man, and Doctor Galloway is trying to shove the plant ahead of the boll weevil and the boll weevil is trying to get ahead and beat the plant. In the end the boll weevil beats the plant, but we get a crop first. We thought it was necessary to have small bolls, because a small boll can grow quicker than a large one, as a rule, but we found that when you got away from the early formation, the stinging or puncturing of the squares, that that is not the worst of it. When the boll is about the size of a walnut, the moth will sting bolls by the thousands or by the millions, and hence they will destroy your crop when you have got it about half made, unless this calix is so thick that they cannot puncture it. That gave us the thought that the large boll cottons were better than the small, and they bring a better price and are so much easier to pick, about fifty-four to the pound, whereas the small King cotton takes one hundred and ten to the pound.

Mr. BEALL. The bolls that are stung do not mature?

Mr. KNAPP. Yes; and they may sting one-fourth or one-fifth of it, and that does not mature; but they destroy a vast amount and retard the maturing of the rest, so that it ruins the whole thing. Now, the question is to get the short-jointed cotton, because the bloom is at the joint, and the short joint will bloom quicker than a long joint, and the short-joint cotton that throws its fruit limbs right close to the ground will mature all the cotton that it can mature—because one plant can not mature but about so much—within two feet of the ground. This great, tall cotton is a waste of energy under boll-weevil conditions, because the weevil will always take the top. Now the short-joint cotton has this advantage, the children can pick that cotton and start for school in the fall, whereas before they had to pick cotton all winter. It forces them also to make their own living on the farm, and we find they can make just as good a living on half the amount of cotton, and the rest of the farm can be used to support their families. They are learning that lesson, and by the hundred thousand.

The CHAIRMAN. In how many States have you been conducting your operations?

Mr. KNAPP. Under your fund we have been conducting operations in Texas; not all of Texas, because the western portion is too dry for general agriculture, but we have been conducting operations in all the agricultural portion, the cotton portion, of Texas, where general farming is conducted, and a little in Oklahoma. We ought to have done a good deal more there, but we were not aware that the boll weevil had gotten there. It is a very secretive animal, and insidious in the way it steals into a State, and we did not know until this spring that it was in Oklahoma so badly. We have only two men in

Oklahoma. Then we are covering the State of Louisiana and the State of Arkansas. Do you want to know definitely just how many men we have?

The CHAIRMAN. I would rather you would go ahead and state the number of States, and then afterwards you can make any comments you want to.

Mr. KNAPP. Very well. About one-fifth of the State of Mississippi where the boll weevil is as far as it has advanced now, past the Illinois Central Railway. Then comes the extension work, which is the same thing, only the board pay the expenses.

The CHAIRMAN. That is the general educational board?

Mr. KNAPP. The general educational board, and I want to say that we never asked the general educational board. This is their own offer, that everything shall be done under the rules of the Department, and all they do is to pay the bills.

The CHAIRMAN. Will you please name the States in which you are operating by virtue of that fund?

Mr. KNAPP. By virtue of that fund we take the remainder of Mississippi, it is not quite all Mississippi work, but say four-fifths of Mississippi, and nearly all of Alabama, or a large per cent of Alabama; perhaps actually 50 per cent would cover it. Then we have some ten counties in Georgia, because when we first enter a State it has not been found best to take the whole State. We commence to study a State six months in advance, to find out what they know locally, and study the local conditions. Then we begin and open on a limited scale so as to get our men adjusted, because generally we expect the men in a State to do the work in that State, excepting one man who is sent in to explain our plans. We have, I think, 10 counties in Georgia, 10 or 12 counties in South Carolina, 8 counties in North Carolina and 22 counties in southern Virginia.

The CHAIRMAN. In all those States how many men do you think you reached with your operations last year?

Mr. KNAPP. What we directly reached I think was 6,000 special farms. We have a book account, so that we have as full control as if we owned them and could manage them and had all the income from them. They are very small farms, of course, from 1 to 5 or 10 acres, or parts of farms.

Mr. POLLARD. Farms of which you had all the income?

Mr. KNAPP. No; we had nothing from them. We derived no income from them. I said the management of those farms was as fully ours as if we had the income from them. Then I can not tell you from recollection how many cooperators, but we calculate about 5 cooperators to one special farm. That is right in the vicinity; the men that look to that demonstration agree to follow the plans, making perhaps about 36,000 demonstrations in a year. This year we commenced in the fall and we have already engaged 10,000 special farms, something over 10,000 special farms, and we expect over 50 cooperating farms that will look to this special demonstration farm, and they carry it on, and they can use it for their whole farm or take a part of the farm, just as they wish.

The CHAIRMAN. Then can you give us an estimate or an approximation of the length of time you think it advisable for the government to carry on this sort of cooperative demonstration work in the States where it has undertaken it?

Mr. KNAPP. Yes, sir. I belong to the class that believe in doing as little as we can—that is, I believe we should do just enough to get the people started, and to get them to doing is the great work. We find by experience that it takes about five years in a county. The first year you have to simply explain, and they begin to get a little inkling. You get here and there a man. The second year you may have an extraordinarily good year, and everybody makes a crop, and that makes them careless, or the next year it may be a very bad year, and very few make crops; and while we prove out in each year, at the same time one year they get discouraged, and the other year they get very optimistic and think they can make a crop any way just as they used to, in the old way; and further, we find it necessary to get seed. We can not afford to buy seed for a county; that is too much, and we have to establish seed farms. Now, understand about seed. Since these steam gins have gone in, they have not had any good seed to amount to anything in many of those States. The steam gin in its hurry rushed all the cotton right through, and they simply took up whatever seed was left in the piles. A great deal of it was deteriorated because it would heat a little. It might germinate, but the plant was weak. Now we teach them to select their seed according to the teaching of the Department. At the last of the year, when the gins are through, we have them all take to the gin at the same time, so that the gin is not hurried, so that they can clean out and put a sheet under and collect their seed, and we have an enormous number of men who just by our instruction and by our going and inspecting, are raising seed, and we thought we were overdoing it, but instead of that we find that they are getting a dollar a bushel for it right along, or about five times what ordinary cotton seed is worth. That has greatly encouraged and stimulated those people, not only the farmers, but the merchants and bankers. In the South they are all farmers.

The CHAIRMAN. I judge from what you say that you have met with a cordial reception of this work everywhere, and that in many, if not in all the counties, people actually contribute considerable sums of money to provide seeds and get the work under way.

Mr. KNAPP. Yes; Texas, Louisiana, and Arkansas, practically everywhere we have been at work, are furnishing their own seed by the carload and distributing so that everybody shall have good seed.

Mr. POLLARD. Does the State do that?

Mr. KNAPP. No, sir; the people.

Mr. POLLARD. What do you mean by that, individually?

Mr. KNAPP. Yes, individually; communities and farmers. One of my men wrote in the other day that he stood on the street and three farmers came up and handed him their money and said, "Here, we want to have a hand in that." They raise it one way and another—business men's clubs.

Mr. POLLARD. I understand you are doing most of your work in Texas, or have been. Is the State of Texas doing anything along this line?

Mr. KNAPP. Not as a State, but the counties do.

Mr. POLLARD. What do you mean by that—the county boards appropriating money to cooperate?

Mr. KNAPP. I mean by that that the leading towns in the county—

Mr. POLLARD. That is, individuals?

Mr. RUCKER. They organize.

Mr. KNAPP. Yes; they organize.

Secretary WILSON. We have cooperative work with the State station.

Mr. KNAPP. Oh, yes; we have cooperative work with the State station, of course.

Mr. HEFLIN. Then the counties have organizations?

Mr. KNAPP. Yes.

Mr. HEFLIN. And they raise money that way with you all?

Mr. KNAPP. Yes, with us.

Mr. POLLARD. It is a meeting of farmers and individuals, and not the county as a county; is that the idea?

Mr. KNAPP. Yes. But I want to say this: It takes some time; you remember it has only been before them four years, and it takes some time before a State can adjust itself. I do not wish to state particulars, but I have information which is direct and positive that bills are now before the legislature of one State, at least, and perhaps before the legislatures of two or three, by which they propose to give aid, or, rather, to allow each county to vote aid; and that, if you are acquainted in the South, you will know is a great deal better. If you voted it as a State aid, maybe we would get it and maybe not. There are always a certain number of men that have been pretty close to the county seat, you know, and we do not live there, you know; we live out in the country. But if it is allowed the counties, so that the counties can do it, they will say to us, "You help us what you can and we will do the rest." Take the city of Natchez. Thirty-four of their leading men in the work time of last fall guaranteed \$750 if we would put a man in to help work that section, and the arrangement was made that way. That was not exactly a county, and yet it was. They were not all farmers; they were all classes of people.

The CHAIRMAN. Speaking generally, your experience and observation would justify you in saying that, in spite of the boll weevil, the infected region is producing as much cotton or more than it did before the boll weevil came?

Mr. KNAPP. Yes.

The CHAIRMAN. Where your methods are followed; and in addition to raising cotton they are being taught to make a living through other things?

Mr. KNAPP. They are learning the principles of self-support and of economy beyond what you would expect, so that a Congressman from there last year complained here in this room to me that I had ruined the banking business. He said I told the farmers not to borrow and they followed what I told them.

Mr. COOK. You are joking!

Mr. KNAPP. No, sir; I am speaking earnestly. I will give you the name of the Congressman, if you wish, and you can write to him. He is well known here. He said their banks were full of money, and he said they could not loan it to the farmers. I asked him where they loaned it, and he said to Fort Worth and Dallas; and this was in this same section that was in such bad condition three years before. I will give you the name of that Congressman; it was Congressman Field.

Mr. BEALL. That was largely true throughout all central Texas last year.

Mr. KNAPP. The farmers were supporting the cities, were they not?

Mr. BEALL. Yes.

Mr. KNAPP. That is a fact.

Mr. BEALL. And the banks were loaning the farmers' money in the fall to the New York banks. The banks of my town loaned them several hundred thousand dollars.

Mr. KNAPP. Yes. Now I want to return. It takes about five years, if you have the funds, to complete the work in one county. You understand that the first year, as I say, it is general work, the second year you begin to get hold of the people thoroughly, and it takes about five years to get the seed and to get things in shape. Then not all the counties take hold of it, and it is sort of progressive. You can not get the men. I am astonished that the large percentage of them are absolutely enthusiastic and persistent, the agents we have been able to find; but at the same time it takes a little while to drill the men, and for that reason we only do a small amount of work in the State, the first year, and expend a little thereafter. So in my opinion, if we knew that we could rely upon a reasonable amount of funds, I would be willing to put up a little guaranty that in ten years we can revolutionize the agriculture of the common people of the South, and then you can stop your appropriations, and then they will contribute to you.

The CHAIRMAN. You had \$80,000, I believe, as an appropriation from the Treasury?

Mr. KNAPP. Yes, sir.

The CHAIRMAN. And in addition to that, last year you used \$70,000 of the other fund to which you have referred?

Mr. KNAPP. No; I am to use it. It was not available until last fall.

The CHAIRMAN. You will use it for the current fiscal year?

Mr. KNAPP. We are using it now; yes, sir.

The CHAIRMAN. Have you any assurance that this fund will be renewed another year?

Mr. KNAPP. Yes, sir. I will tell you what I think. They sought me here in Washington. I never asked them for a dollar. They sought me and asked me if they might contribute without any control in any way or in any direction, but simply to pay the bills. They were enthused with the work. They had found it out from others, not from me. My plan has been to do things and let the things do the talking. They asked me the first year what I could use. I only wished a small amount. The second year they again asked me, when the \$32,000,000 was given by Mr. Rockefeller, what I wanted. They called me to New York the first time, and asked me "How much do you want of this?" I said, "I do not want any if you put it in that way. I never beg." "Well, we do not mean that. How much can you properly use?" I wrote out the amount, the president of the board looked at it and said, "That is all right." I had no further conference with them, and they voted the \$70,000. They assured me when I went into it—because I was a little careful about that, about being gotten into a thing and having it advertised and then dropped, and they are a class of men that would not do that—they assured me that they were ready to back me for a million.

The CHAIRMAN. You are sure that you will have an equal amount next year from this source?

Mr. KNAPP. I think so.

The CHAIRMAN. What, in your opinion, is the amount you could economically and profitably spend for the continuation of the work in the Southern States?

Mr. KNAPP. I will answer that; but I want to say, first, that I wish this committee would investigate our work. I claim that our men are doing more economic work than any other employees of the Government. They are traveling at less expense and they are living with the farmers, and every cent is looked after, and I claim that their work is more economical than any other work, whether public or private, in the United States. My men traveled in the State of Arkansas for \$43 and a few cents per man expenses, covering all expenses, for the month of last November. I remember looking it up. I want to say that we would be glad to have an investigation. When they talk of a Congressional investigation, that is what we want. That is just all we ask for, and the more of it we have the better, because it is our fad. The men live right close to the people they are working with.

We are very near the limit on our \$80,000. We have got to cut out some communities, and we can not work others as well as we would like to. The boll weevil extends over a larger territory every year, about equal to the territory of New York. That territory has now a rim of 900 miles around there, and it goes east and it goes west, and you do not know it, and you do not realize it until the following spring; and that is why the States can not handle it, because many of them would have to call their legislatures together, and they do not know it until they begin to plant, and then they have not the trained men that know just how to handle the proposition and get right at the farmers, and it has got to be done immediately. We have those men and we train them in advance. Mississippi has trained men ready to meet it the minute that it invades. I do not beg for anything; I do not ask for anything. I can earn my living. But I think that in order to do good work we ought to have, or rather I think the people ought to have, \$125,000 a year.

Mr. POLLARD. From the Government?

Mr. KNAPP. From the Government, yes sir. Then I will try to raise individually a sum equal to that from friends.

The CHAIRMAN. Do you think if this work is continued for ten years, as you say it ought to be, the appropriation each year would increase in like ratio?

Mr. KNAPP. I do not think it ought to.

Mr. GALLOWAY. That ought to be the amount, \$125,000.

Mr. SNAPP. That is my idea, and stop right there. I do not believe in feeding people, no matter how excellent the work is, and I think that is the only work that the country ever did that reached the home people, the one-gallus man, in the way this has done. This will do it.

The CHAIRMAN. Your idea is that the work along this line is the only work that really gets results in the contest against the boll weevil?

Mr. KNAPP. That is what the people say to me.

The CHAIRMAN. I do not ask you to say any more than that.

Mr. POLLARD. In your reply to a question by Mr. Cook you spoke about the race between the plant and the boll weevil. You need not tell us how they are getting along in the race, but I would like to

know whether Doctor Galloway has gotten a plant that will mature before the boll weevil comes around.

Mr. KNAPP. Yes, he has got the plant; and there is where we owe great credit to the plant breeding work. The Doctor has kept right up to this work, shoulder to shoulder.

Mr. POLLARD. Then how does it manage to propagate? Does it deposit its egg in other kinds of foliage and keep on developing just the same, or does it depend on the cotton?

Mr. KNAPP. No, sir; it depends on the shiftless farmer.

Mr. COOK. It depends on what?

Mr. KNAPP. The weevil depends on the shiftless farmer, who grows cotton late enough to keep the weevil over. If they would all adopt our plans, we could get our cotton out of the field by the first of September in the southern portion of the cotton belt and by the middle of September all over the cotton belt, we could then plow these lands and pretty much eliminate the weevil, because that would be too long a period for him to hibernate from that until spring.

Mr. GALLOWAY. If I may be allowed to say a word right there, I would like to say that of course we have as yet hardly begun to reach the mass of farmers with these improved types of cotton. We have just reached the point where we have gotten the types, and we must not only secure types that have these properties of maturing early, but we have to change those types as we move over into new districts. The cottons for the great bottom lands of Louisiana, those rich lands, must be very different from the cottons for the uplands of Texas, and our breeders are working constantly to get this cotton ahead of the weevil. Our cotton developed at Fort Worth, Texas, (an improvement of the Triumph cotton mentioned the other day,) we are now disseminating in the cotton section, but those cottons will not do for the rich bottom lands of Texas where those cottons grow tall.

With reference to another question you asked, Mr. Pollard, I may state that after these improved cottons make their crop, they may go on growing and put on squares until frost comes, and the weevil continue developing in those bolls, so that there will always be a supply for the weevil, even with these improved cottons. The cotton that Bennet has developed has the property of producing all the bolls on short stalks near the ground, and instead of having to follow the advice given when the cotton was first sent out, to plant it farther apart, they can now plant close together and produce as much or more, even though the cotton matures quickly, as could formerly be produced by planting far apart; so that by the work that Doctor Knapp does with the people they can produce as good crops, and as much cotton that will meet the market conditions in all this section.

Mr. KNAPP. After the cotton is picked out, the farmers will generally turn their stock in, so that the stock eat off the stalk tops. If everybody did that, I think we would reduce the boll weevil to a small difficulty. That is about the amount of it.

Mr. COCKS. Would it not be practicable to burn the cotton stalks after the cotton is picked?

Mr. KNAPP. There is not any great amount of the weevil that live in the cotton stalk itself through the winter. They live in these half-matured cotton bolls. They do not live in the stalks.

Mr. COCKS. If all those cotton stalks were burned, would not that do away with that possibility?

Mr. KNAPP. You would meet with some difficulty about that. The greatest trouble would be the destruction of the humus, and if there are no weevils in this stalk, there is no reason for burning the stalk. If there are weevils in the bolls, you must burn the whole thing. But the farmers pretty much refuse to burn the stalks.

Mr. LAMB. But would they not fall into a habit of turning the stock in and letting them eat the stalk? It seems to me that is the solution of the question.

Mr. KNAPP. The weevil is pretty tough. He will live through pretty nearly everything. We have put him in 95 per cent alcohol and left him for three hours, and he was only staggering drunk. But he will not live to go through an animal.

Mr. HAWLEY. I was very much interested in those ten commandments of agriculture with which you started out. Have you printed those anywhere?

Mr. KNAPP. Yes. If you will give me your name and address, I will send them to you.

At 12 o'clock m. the committee took a recess until 2 o'clock p. m.

COMMITTEE ON AGRICULTURE,
HOUSE OF REPRESENTATIVES,
Wednesday, January 22, 1908.

NIGHT SESSION.

The committee met at 8 o'clock p. m., Hon. Charles F. Scott (chairman) in the chair.

STATEMENT OF BEVERLY T. GALLOWAY, CHIEF OF THE BUREAU OF PLANT INDUSTRY, DEPARTMENT OF AGRICULTURE—(Continued).

The CHAIRMAN. We will resume the hearing with Mr. Galloway before us.

Mr. GALLOWAY. Mr. Chairman, we have a few more matters which we are going to attempt to present so that we will get through this evening by half past 9, or earlier if we can, and I will ask Mr. Woods to take up the question of our grain work throughout the country, our grain-grading work, and dry-land agriculture, three subjects that are closely related. Mr. Woods is perfectly familiar with the work, and I think can present it in such a way as to give you a general idea of the main problems in a comparatively short time.

The CHAIRMAN. We will be glad to have Mr. Woods give us, as succinctly and as clearly as possible, just what has been accomplished in the direction of carrying out the mandate of the last two appropriation bills in regard to standardizing grain.

Mr. WOODS. I will take that up second, Mr. Chairman, as it comes second on the list. Grain investigations comes first, but if you prefer that I take up grain standardizing or grain grading first I will do so.

The CHAIRMAN. Follow your own preference.

Mr. Woods. The grain investigations, as we call them, include the general study of the small grains in the various parts of the country and the testing of the varieties introduced in cooperation with our seed and plant introduction work. This testing work is done almost entirely through cooperation with the State experiment stations and with practical farmers. We are doing more cooperative work on this line, perhaps, than in any of our other groups.

The principal projects on which we have been working the last year are, first, the introduction of the Kharkof wheat, which is a hardier variety of the Turkey wheat. The Turkey wheat is grown very largely in Kansas and Nebraska, and is a very fine flour wheat, but the area where it can be profitably grown is rather limited. The Kharkof, the new introduction, grows successfully in the southern portion of South Dakota and west to the one hundredth meridian, producing a very fine quality of grain. It is a little earlier than the ordinary Turkey wheat, and for that reason escapes the rust better than the ordinary Turkey wheat. Since the introduction of this variety the Kansas growers have introduced at several times large quantities of this hardier Kharkof wheat, as it is more satisfactory than other varieties. Its area, though, is east of the one hundredth meridian. It is now being grown to some extent west of the one hundredth meridian on account of the rather wet years which they have been having in the west for the past four or five years.

But all investigations have shown that these wet periods are followed by drought, and in a few years more, western Kansas, western Nebraska, and the western Dakotas will have another drought, and the Kharkof wheat and all other eastern wheats and grains, including corn, will die. They will not grow with a less amount of water than 12 to 14 inches. So that west of the one hundredth meridian we have been trying to interest the farmers in the growing of the durum wheat, which is a hard, spring wheat introduced from Russia, yielding from 35 to 40 bushels per acre on a very small rainfall and producing a successful crop with 8 inches of water. That is about the lowest that that region west of the one hundredth meridian ever reaches, so that we believe we have in the durum a spring wheat which will stand the drought. Then, in addition to that, we are trying to convert the ordinary durum wheat, which is now a spring wheat, into a winter wheat, so that in Kansas and in Oklahoma and in western Texas it can be planted in the winter, and, of course, get the advantage of a little larger rainfall during the winter and produce a little better than when planted in the spring. It is a rust-resistant wheat, standing up perfectly where the other wheats succumb to the rust, and we are using it to breed rust resistance into the spring wheats of the North, especially those of Minnesota, Wisconsin, and Michigan. Those spring wheats, the Blue Stem, especially, are very susceptible to rust. We have crossed the Blue Stem with the durum, and we have now a hybrid which is equal to the durum in rust resistance and has the berry of the Blue Stem. So we hope we have something there for the spring wheat districts.

The CHAIRMAN. Are you troubled much with rust west of the one hundredth meridian?

Mr. Woods. Yes, on ordinary wheats.

The CHAIRMAN. I thought that the rust was not troublesome except in wet seasons in a humid country.

Mr. Woods. The only time it does any harm west of the one hundredth meridian is during wet years, but it is only during wet years that you can grow anything but the durum wheat west of the one hundredth meridian. So that it will not be a problem during the dry years there. But rust is a fungus that can grow with very little water, although it does not do as much damage when the season is dry.

Now, in the South a winter forage crop is of great necessity. We have been working with the Tennessee winter barley, a variety which we developed in cooperation with the Tennessee station some five or six years ago. It is a very much better yielder than the ordinary winter barleys of the South, and it has a very much wider territory in which it will grow successfully than the ordinary winter barley. That winter barley has also been tested extensively in cooperation with the Kansas and Nebraska stations and has proved successful even as far north and west as those States, producing a very excellent winter forage, and a very good crop of grain in the spring.

Mr. GALLOWAY. Most of the Members can see this small, dark area [exhibiting map to the committee]. That is the area in which the winter barley was grown in 1903, and this [indicating] is the territory where we are extending it. This is a crop that grew here [indicating]. Here in this section of the country [indicating] winter barley will produce 40 bushels of grain where wheat, planted alongside of it, only produces 15 or 20.

Mr. Woods. Another introduction for the semiarid region west of the one hundredth meridian is winter emmer, which has been tested there for several years and is proving to be a very excellent crop, producing a very heavy yield, and it is very drought resistant.

The CHAIRMAN. What other grain does emmer resemble?

Mr. Woods. It looks a little like rye, or, perhaps, a little bit like oats.

Mr. GALLOWAY. It is very much like rye.

Mr. Woods. It is a very nutritious grain, and very valuable, especially on account of its drought-resisting qualities.

Mr. Hawley. Is it good for the people, for human food?

Mr. Woods. It is used in Russia, but I do not think our people would use it unless they were forced to. The flour made from emmer is like rye flour.

Mr. Lever. That winter emmer is a new introduction from Russia?

Mr. Woods. Yes. In the Sacramento Valley, California, the wheat has been deteriorating for several years, becoming softer and more starchy. In the northern plains region they have had what they call a white berry and a yellow berry, the white berry forming in the durum and the yellow berry growing in the winter wheats, the hard wheats. There has been a great deal of discussion as to the cause of this deterioration. Our investigations have shown that it is probably due to an excess of moisture during the time that the grain is heading or maturing. In some cases, in the irrigated areas, it is due to overirrigation. We have found that where the moisture can be controlled this deterioration does not occur. In California, Oregon, and Washington, the deterioration of the grain is due in a large measure to the same cause; that is, overirrigation. It is also due in the case of the western wheats to the destruction of the humus in the soil by the failure to use proper leguminous rotation crops. This

may also cause a low yield and a white berry. The solution of the difficulty lies in the control of the water and nitrogen of the soil.

Mr. COLE. Do you think you can raise the barley you spoke about in the southern part of Ohio?

Mr. WOODS. Yes, sir. The Tennessee winter barley will grow as far north as that.

Mr. COLE. When do you sow it?

Mr. GALLOWAY. Sow it in the fall like wheat, like fall wheat.

Mr. COLE. And then when does it mature?

Mr. GALLOWAY. It matures the following June, just about like wheat.

Mr. WOODS. In the rust investigations the principal work is the production and testing of the hybrids previously mentioned.

Mr. GALLOWAY. With reference to the durum wheat, Mr. Woods probably omitted a point that would be of interest. That is, that this year, from all the data that we can secure, the production will be about 45,000,000 bushels. That wheat was introduced about six or seven years ago, and that 45,000,000 bushels represents the growth of the industry since the introduction of that particular wheat. There will be exported probably about 20,000,000 bushels and about 5,000,000 bushels will be sold for seed, leaving about 20,000,000 bushels here to be utilized for domestic purposes and the manufacture of bread. In other words, we have an industry built up in a region that formerly in dry years produced nothing agriculturally worth between \$40,000,000 and \$45,000,000 to that section of the country.

The CHAIRMAN. What percentage of that amount do you think would have been grown except for the introduction of this durum wheat?

Mr. GALLOWAY. Well, we can not say as to that. The durum wheats are the only wheats that have been grown out there during dry years, and it is one of those things where the right psychological moment was struck. Furthermore, of course, the Department was merely a means for starting the thing going. If it had not been for the receptivity of the people and the conditions existing there we could not have made such a good showing. It was introduced by the Department six or seven years ago, and the first year we distributed about 1,000 bushels of seed. From the start, of course, it rapidly spread, and it represents to-day the industry just mentioned. The questions now have to do mainly with the improvement of types or varieties, so as to meet certain special conditions that are arising and will continue to arise in that region.

Mr. HAWLEY. In the southeastern portion of Oregon there is a large area that we call the Plains. It has 13 or 14 inches of annual moisture, part snow and part rain, mostly snow, and it has an elevation of about four or five thousand feet. Would the durum wheat grow there?

Mr. GALLOWAY. I can not say for that; in all probability it would not, on account of the elevation. But there are some wheats that are adapted to those highlands.

Mr. WOODS. The Kubanka durum does grow that high.

Mr. GALLOWAY. When we sent to Russia to get these wheats, the man who went over there was familiar with the problems in this wheat-producing section, and he selected wheats to fit the different conditions.

Mr. WOODS. There is some opposition to the durum wheat in the country immediately west of the one hundredth meridian, in Kansas and Nebraska, on account of the fact that in these wet years they are having a heavy enough rainfall to grow the ordinary wheats successfully. But, of course, that is a temporary condition, and the permanent agriculture of that region must be based on drought-resistant crops and upon methods of agriculture adapted to conserve the moisture supply in periods of great drought which have always come to that region at times and will doubtless continue to come in the future. As far as historical records go and as far as the plants of that region indicate, these droughts have always come at certain periods and have lasted for several years, and people who have gone out there to try to grow crops as they did in the east have failed and come back east. Our idea is that a permanent agriculture can be built up in that region if it is built on the right principles.

Mr. GALLOWAY. There are two crops right here that have just been introduced. They are sorghums, grain producing. One of them comes from Natal and is a grain-producing sorghum, and that has been grown quite successfully in the Panhandle region of Texas. This is another grain-bearing sorghum which is absolutely new; it is from the dry sands of Egypt [indicating two samples to committee].

Mr. HEFLIN. How would that grow down in my country?

Mr. GALLOWAY. It would grow there, I think, and will be supplied just as fast as we can get seed.

Mr. GILHAMS. How does that differ from Kafir corn?

Mr. GALLOWAY. It is one of the Kafir corns.

The CHAIRMAN. Has the unusual rainfall in the western part of Kansas during the past few years been sufficient to reduce the normal yield of durum wheat?

Mr. WOODS. It has not reduced the yield, but it has made occasional white berries, which makes the wheat much softer; makes it a little better for a flour wheat, but not as good for exporting. It really does not injure the wheat. It makes it better for the millers; but is not as good export wheat. That is where the difficulty comes. The export trade wants a very hard, flinty wheat, and they complain of these white berries. Our own mills do not complain of them.

In the Panhandle of Texas, in cooperation with the Texas experiment station, we are conducting what we call our Amarillo experimental farm. That is one of the series of dry-land agricultural farms conducted in cooperation with the state experiment stations in that area; that is, Texas, Oklahoma, Kansas, Nebraska, North and South Dakota, Colorado, and Montana. That comprises the great plains region, where, west of the one hundredth meridian and to the edge of the mountains, the rainfall, during considerable periods, runs down to 8 inches for several years at a time. At this Amarillo station we test these sorghums, Kafir corns, durum wheat, emmers, etc., and we test them also at the whole series of stations from there north.

The CHAIRMAN. You will discuss the work at those stations more in detail later on, I believe?

Mr. WOODS. Yes, I will, later on. At that particular station we have several draught-resistant wheats besides the durum, and a black, winter emmer, introduced from Russia, which promise to be very valuable. The Kubanka durum does well there, and also the Galgalos and the Fretos wheats are adapted to the hotter portions

of that territory, especially Arizona, New Mexico, western Texas, and southern Oklahoma. I think, in this connection, I may temporarily skip the grain standardization, and take up dry-land agriculture, as it is so closely connected and really grew out of this grain investigation work. It is found on page 160 in this project summary we have here.

Mr. GALLOWAY. Mr. Chairman, this map [indicating] may enable you to get an idea of where these dry-land stations are located. We start here at Williston, N. Dak., and run down to the Panhandle. There are 8 or 9 altogether. In most places, not all, we have located them in cooperation with experiment stations, and where that has not been practicable, as at Akron, Colo., we have independent stations—but work in close touch with the regular experiment stations.

Mr. WOODS. As I have already stated, the conditions existing in this region are so peculiar that it is recognized by all the experiment stations in the region and by the farmers that the permanent agriculture of the region must be based upon very carefully worked out data, so the stations are cooperating with us in establishing a series of experimental farms on distinctly different soil types and over areas extending from the north to the south. We have 10 of those farms already established, and the work on them is similar. The land is laid out in definite plots, and the different cultural systems that have been followed by farmers, or that have been suggested by experience in other countries where similar conditions exist are being tested. These various dry-land crops are being grown in rotation, and an attempt is being made to find winter cover crops that will supply humus to the soil. In the heavier, so-called gumbo soils the cultivation will depend upon getting organic matter into those soils, lightening them up so that they can be cultivated. Now, without sufficient organic matter they are very difficult to handle. These farms are, furthermore, in many cases located on projects of the Reclamation Service, so that we have, in connection with our dry-land area, land below the ditches that can be irrigated, making it possible to study the relation between an irrigated area and a nonirrigated area; that is, a dry-land section and a smaller section under water. This phase of the work is carried on in cooperation with our irrigation service in the Department and the bureau of soils and by our bureau all cooperating with the Reclamation Service.

The CHAIRMAN. In what way does the Reclamation Service contribute to that cooperation?

Mr. WOODS. They set aside the lands, put up the buildings, put up the fences, and prepare the ditches and the drainage. Then our bureau looks after the work with crops. The irrigation office of our department looks after the laying out of the farm for irrigation, and the soils bureau gives us a map of the farm, showing us the types of soils that are there and whether or not they contain alkali.

The CHAIRMAN. Do you find as many different types of soil in the arid region, running from the North to the extreme South, as you find over a corresponding latitude in the humid section?

Mr. WOODS. I think not. The types are fewer in number and very much larger in area.

The CHAIRMAN. It is practically the same problem?

Mr. WOODS. It is a very similar problem in all. The only difference is the difference in latitude.

There is no use in going into the discussion of results on these farms yet, because there have been no particular results yet, except on the Amarillo farm.

Mr. GALLOWAY. I might add a few words. Our object here is to accumulate evidence and data which will enable us to give to men who are already there expecting to make their living and men who are contemplating going there reliable, conservative information, so far as we can, as to the manner in which they should attempt to make a livelihood under these peculiar conditions. The last few years there have been a good many people attracted out there. not only the climatic conditions have attracted people, but things artificially developed have attracted people; real estate boomers and railroads and all such have been inducing people to go out there and holding out promises of quick returns, and those promises have in a measure been fulfilled because of the fact that the conditions there have been for the time favorable. But sooner or later—it may be next year—there will be a dry spell, a drought, and many of those people will have to go back or will have to work out some method of keeping body and soul together there until they can get on their feet. It is to reach and help those people that we have established those stations, those farms, for the purpose of working out the fundamental principles which should guide them in agricultural practice in such a peculiar region.

Mr. HAWLEY. In the durum wheat crops, do you ever have total failures, or almost total failures, of the crops?

Mr. GALLOWAY. We have not had any so far.

The CHAIRMAN. You expect to get the best results in this region by developing forage crops, do you not, so as to make it possible for people to maintain a few head of cows or other cattle on a small area?

Mr. GALLOWAY. As conditions are out there now, it takes a great many acres to sustain one animal. What we want to encourage those people to do is to raise more forage crops, to sustain more animals. More animals need better husbandry and a better agricultural condition all around, and as fast as we can accumulate the evidence, acclimate these crops, and introduce these new things we are getting together this information that the people need.

The CHAIRMAN. I would like to ask you one question in regard to the detail of your appropriation for this work. I notice that in your estimate of the projects you ask frequently for an increase of \$250 to \$600 over what you had. That is, you estimate for an increase of that amount over what you had last year, notwithstanding the fact that last year you were obliged to open up the farm, I presume had a lot of plowing to do and other preliminary work of that sort, which, I should think, would be more expensive than the work you expect to do next year.

Mr. GALLOWAY. Not necessarily, because the expense of getting these crops in and taking care of crops is going to add some to the items, and the main feature of our expense would probably be in connection with men, whom we desire to have there and keep there a part of the time. That is the general plan which runs through the estimates, although some of these items it may be found desirable either to suspend or transfer to another group.

The CHAIRMAN. Is it your practice to try a great number of things in a small way on each of these farms, or do you try a few things in a large way?

Mr. GALLOWAY. We have both practices in vogue, but usually our plan is to try a few things in a large way, an agricultural way, because that is what the people want. At the same time we are following the other practice as far as we can in strictly experimental work. Our men who are working in allied lines all have the opportunity of putting their particular specialties at these places where it seems feasible or practicable to do so. For instance, our sugar-beet man will have some work going on at one or two of these places, his work being the trying out and testing out of drought-resisting sugar beets as a crop for stock or some other purpose.

The CHAIRMAN. What do you do with the crops you produce on these farms?

Mr. GALLOWAY. The crops so far that have been produced are turned in to the experiment stations with which we have cooperative arrangements, but on these particular farms we have not got to that yet. On the Reclamation Service farms probably some similar arrangement will be made.

The CHAIRMAN. As a result of any of the work in your bureau, do you ever have anything to sell?

Mr. GALLOWAY. No, we seldom have anything to sell. We buy fruit for experimental shipment, but we never sell any fruit.

Mr. WOODS. Occasionally on these farms we raise some hay or something that we do not want to use, and where it is in cooperation with the station they take care of what is not needed.

Mr. GALLOWAY. The station takes care of it, where we have cooperation, but where we have anything to sell it is sold under the ordinary government practices—condemnation and public sale.

Mr. WOODS. I do not think we have had anything of that kind so far, but that is the way we would have to do it if we did have anything.

Mr. HAWLEY. In this sheet you give here, are these percentages, "Beet Sugar and the use of the beet," from the beets grown in the arid region?

Mr. WOODS. Yes, but that is under irrigation. I think Doctor Galloway wanted me to discuss, in connection with this western agricultural extension, the work on the irrigated portions of these same tracts. These are percentages from the beets grown on the irrigated tracts I think, in most cases.

Mr. GALLOWAY. We have the composite problem of providing crops for the man who has some land below the ditch and the man who has land above. A great many people are situated in that way. They must have crops that they can handle both on dry land and irrigated land.

Mr. HAWLEY. There is a great deal of land, a great area of land, as good as any that can be put under water, that can never be put under water, and if you can redeem that it will be a great service.

Mr. GALLOWAY. That is what this project has for its principal object; what we call western agricultural extension, or an extension of agricultural crops into this western agricultural region.

Mr. Woods. Our men, in introducing dates and Egyptian cottons, are working on these farms. We are concentrating the work as fast as possible, so it is reducing the cost and makes it possible to give the stations better attention.

The CHAIRMAN. The Egyptian cotton is not grown in a country short of water?

Mr. Woods. No, that requires irrigation, although it is quite drought resistant and quite alkali resistant. It will grow with a comparatively small amount of water. This year the plants grown at the station at Yuma yielded nearly two bales to the acre of good cotton.

Mr. Cocks. Did it have the same color as the Egyptian?

Mr. Woods. Yes, the fiber is as good and the color is as good as any Egyptian cotton ever imported.

Mr. Woods. The subject of grain standardization is next. We now have this work organized with the scientific investigation, located at Washington, and with laboratories located in several of the more important grain centers for determining the condition and quality of grains passing through those markets, as may be requested by the grain trade or by anybody who wants to know the condition of grain samples. These outside laboratories do no investigating, but simply determine the condition of grain.

Mr. GALLOWAY. For the information of the committee it might be well, in a word or two, to explain what we mean by grain standardization. There is, as some of you are probably aware, a system of grading grains throughout this country, that grading being done by chambers of commerce and similar bodies, but it is claimed that the system is unfair to the purchaser and producer of grain in that the purchaser or producer never have any redress as to whether the grain is graded properly or not. Now, that has resulted in a great deal of controversy and a great deal of conflict in this country between the grower on the one hand and the handler, the seller of grain, on the other, over the grain used in our interstate commerce. It has resulted in seriously injuring our export trade in grain, for the reason that while grain is nearly all sold on the certificate plan and it frequently happens that grain is graded as one thing and the certificate is furnished to that effect, it is found that the grain is not what the certificate claims it is. In other words, the money, most of it, has passed before the grain reaches the buyer abroad, with the result that he complains that he has been unfairly treated. To meet those conditions and to attempt to work out some definite standards of grains, we are establishing certain laboratories. The conditions in the grain business are just about what they would be if the city of New York had a yardstick thirty-six inches long, Washington one thirty inches long, and Chicago one twenty-eight inches long. This means that there is absolutely no uniformity of methods in grading grains. That is, there is an attempt at system, but it depends primarily and fundamentally on the judgment of the man who goes out and takes hold of it and puts his hand in a car and says, "That is No. 2 corn," or "That is No. 2 wheat." He may have had a good breakfast and be feeling all right, or his judgment may be a little off for one reason or another. What we want to do is to establish some factors that can be depended on to standardize these grains. With that explanation, perhaps, you will better understand what is said.

Mr. HAWLEY. What authority have you to enforce your opinions?

Mr. GALLOWAY. We have no authority. We simply have authority under the clause in the appropriation bill to do this work and to develop, if possible, apparatus for determining the factors and then say what factors are to be used in grading certain grains. In order to check up with shippers abroad, we have a man over on the other side who, when a cargo of corn goes out from Baltimore, is notified. When it reaches the other side he makes an examination and then we check up and see if it is what it ought to be. Not only that, but we are checking up the methods of handling grain and the deterioration of grain in transit. A great quantity of grain is lost by bad handling and bad shipping methods, and this work has for its object not only the establishment of standards, but the securing of objects which will tend to prevent the losses of grain in transit. I may say that there are certain cities where export grain is sent out that have become so notorious for their bad inspection methods that foreign buyers simply avoid those places; on the other hand, there are certain others that have made such a reputation for their critical method of handling grain and inspecting grain that foreign buyers go to those places.

Mr. HAWLEY. Has your experience led you to believe that the people who have grain to sell will adopt your methods of grading grain, so that it will be uniform?

Mr. GALLOWAY. That is the object of establishing these laboratories at grain centers. They are points to which disputed questions can be referred, and our laboratories now located at those places act upon those things constantly.

Mr. HAWLEY. Do you believe that in due time all these questions will be referred to your laboratories?

Mr. GALLOWAY. I am of the opinion that if we work out definite standards and get them established and it is found generally that these standards are reliable, naturally these organized bodies will necessarily have to adopt such standards, and that will bring about a standardization through what might be called—and what I believe Senator Hansbrough calls—an inductive method.

The CHAIRMAN. I think it would also help the members of the committee to understand what Doctor Woods is going to say if their memories should be refreshed in regard to the language of the appropriation bill in which this investigation is authorized. It is very brief, and I will just read it.

To enable the Secretary of Agriculture to establish and maintain, at such points as he may deem expedient, laboratories for the purpose of examining and reporting upon the nature, quality, and condition of any sample, parcel, or consignment of seed or grain, including rent and the employment of labor in the city of Washington and elsewhere, \$65,000 (increase of \$25,000 submitted), or so much thereof as may be necessary; and the Secretary of Agriculture is authorized to report upon such samples, parcels, or consignments from time to time, and the reports so made shall serve as a basis for the fixing of definite grades and also for the issuance of certificates of inspection when requested by the consignor or consignee of any grain entering into foreign commerce.

Mr. WOODS. The first two years we had a laboratory at Baltimore and one at New Orleans, and though there was considerable doubt by the grain trade as to the utility of these laboratories, they are increasing rapidly in value and favor and are rapidly educating the grain men to determine the quality of grain by more accurate methods of measurement than heretofore. The moisture apparatus which we introduced is simply a series of flasks containing oil which is heated

up to a certain temperature, driving the water out and condensing in a measured tube which shows the per cent of water contained. The water is condensed in the tube and the amount of water there shows the per cent of the grain.

Mr. GALLOWAY. That is an important factor?

Mr. WOODS. It is the amount of moisture which determines its keeping value. If corn contains more than 14 per cent of moisture, it will not ship any distance without molding, and wheat containing more than 14 or 15 per cent will also mold in transit.

The CHAIRMAN. What are the other factors besides moisture that enter into the grading of grain?

Mr. WOODS. The amount of dirt in the grain, which can easily be measured; the amount of broken grain; the size and weight of the kernels, and the weight per bushel are the principal factors; also the color of the grain.

The CHAIRMAN. Have you devised any other apparatus except this for the determination of the moisture contained?

Mr. WOODS. We have apparatus, but it is not entirely satisfactory—an apparatus for determining dockage, or the amount of dirt and chaff in grain. That apparatus is not yet satisfactory. It is a series of sieves, and in a considerable degree it is a modification of the system in use in the Northwest, but it varies too much. We are working on a piece of apparatus which we think may be of assistance in that line.

Mr. LAMB. The only one you showed the chairman and myself was the moisture apparatus.

Mr. WOODS. Yes, the moisture apparatus, but we also showed you the sieves, for determining dockage.

Mr. LEVER. Doctor, this whole plan of grading is intended to protect the grower against the buyer of grain; is that the idea?

Mr. WOODS. It is intended to determine the real elements which enter into the grain, in a measurable way and in a way that can be measured readily and quickly enough to meet the demands of commerce, and to prevent any deception as to its quality. A No. 2 corn should contain 14 per cent of moisture. We have taken notes on samples of No. 2 corn by the best graders we could get, and we have found that No. 2 should contain 14 per cent. If it contains 16 per cent it is not No. 2 corn, and if a dispute arises and they send a sample to the laboratory and we examine it and find that it contains 16 per cent, that settles the question. We have had hundreds and hundreds of cases in our Baltimore laboratory and New Orleans laboratory of just that kind, and they take our word for it. Many of the grain men are now introducing this moisture apparatus into their own elevators.

Mr. LEVER. Would it be practicable to put this same scheme into operation with respect to the grading of cotton?

Mr. WOODS. The grading of cotton requires that the moisture be determined. Probably the same apparatus could be used, but the principal factor in the grading of cotton is the luster and the cleanliness of the fiber.

Mr. LEVER. And the length?

Mr. WOODS. Yes, the length would be another element; but they do not consider that as a part of the grade.

The CHAIRMAN. Will you not tell us about what constitutes one of these laboratories in the way of equipment and men?

Mr. WOODS. We have a room with a good north light, if we can get it, and a man who is well acquainted with the general problems in the grain business. There is an assistant to him who can take his place when he is absent and assist in handling the samples. Then, during the rush of the grain business, we hire temporary labor to make the separations—usually one or two, but sometimes three men—We also have this moisture apparatus, which costs \$20, and a pair of scales. That is all the apparatus we use at present.

The CHAIRMAN. How much does it cost to equip one of the laboratories with the apparatus?

Mr. WOODS. The moisture apparatus costs about \$20. We usually try to get two sets, that would be about \$40. The scales cost about \$80. The miscellaneous supplies of other kinds, I should say, perhaps \$100. The rent usually costs us from \$250 to \$500 a year, depending on where the laboratory is located.

The CHAIRMAN. So that practically all of the expense is in the salaries and wages?

Mr. WOODS. Practically all in salaries and wages.

The CHAIRMAN. You speak of employing additional men during the rush of the grain season. Is that due to the fact that you are called on very frequently to settle disputes or to issue certificates?

Mr. WOODS. Well, they want statements; they want certificates regarding their samples; they want the moisture content; they want the amount of dirt and dockage, and the amount of weed seed, or something of that kind.

Mr. WEEKS. Who wants this?

Mr. WOODS. Usually the buyer or the seller; and the inspectors very often come to us to get that, in order that they may be better able to judge the samples.

Mr. WEEKS. Would they be willing to pay for that information?

Mr. WOODS. I suppose they would, after they had been educated up to it; no doubt, they would.

The CHAIRMAN. Have these inspectors in any of the cities apparatus of their own for determining moisture content?

Mr. WOODS. I think some of them have put them in; I think Chicago inspectors have put them in.

Mr. GALLOWAY. Several of them have had the apparatus made and are using it.

The CHAIRMAN. They have installed your apparatus; or did they have apparatus before yours was devised?

Mr. GALLOWAY. No, sir; they used nothing but the hand. On page 69 of the report the details are given of the number of samples which have been submitted. Turning to New Orleans I find that 1,000 samples have been submitted and examined in the laboratory in the past eight months. In that connection, Mr. Chairman, if there is no objection, I have here something that might be of interest to the committee for insertion in the record, and that is this summarized statement, prepared by Mr. Shanahan, who is in charge of this work and who has had twenty years' experience in the grain business. In that summarized statement he gives what, in his judgment, should be the fair estimates of the number of bushels of grain that should be han-

dled at those markets, those twenty-nine markets that he mentions—the number of bushels shipped and the number of elevators; the storage capacity of the elevators; railroads handling the grain; estimated earnings of inspection department; and a lot of other data of that kind. Would that be of any use for insertion in the record?

The CHAIRMAN. I think it might go in the record.

Mr. GALLOWAY. I notice that the average charge per carload is about 36 cents. That is the average charge, taking these twenty-nine markets.

Mr. LAMB. Thirty-six cents a what?

Mr. GALLOWAY. The average cost is 36 cents per carload. The estimated cost of the weighing of the grain in addition to the inspection would be \$530,000.

Mr. WOODS. The new laboratories which we propose would probably be located in Buffalo, Kansas City, Philadelphia, and Chicago. Those points may be changed, but they are the points where it seems most desirable to locate these laboratories.

Mr. HEFLIN. One question. How many grades do you usually have of wheat? How does the scale run; is No. 1 the best?

Mr. GALLOWAY. Usually about three grades.

Mr. WOODS. There are different classes, of course, as to spring, hard winter, and durum.

Mr. HEFLIN. If a seller says the wheat is No. 1 and a buyer says it is No. 2 you are enabled by this process to tell them exactly what it is?

Mr. WOODS. We will be, but the grades used by the trade have not been correlated in the case of wheat with these definite, measurable factors. We can, however, tell them, because we have our experts on the grades as they now exist, and we do have a great many of those questions simply based on present commercial usage.

The CHAIRMAN. Does the flour-making quality of wheat enter into the present grading?

Mr. WOODS. It does in the Northwest; up in Duluth or Minneapolis the flour-making quality of the wheat is becoming more and more an important factor.

The CHAIRMAN. How do the inspectors test that?

Mr. WOODS. They have a special laboratory up there. It is a private concern now, I think, and a fee is charged for testing the bread-making quality of the wheat by a process which is fairly good. But if we do any work in the Northwest, we shall have to include the testing of the bread-making quality of the wheat, and we will need considerable improvement over the methods which they use there now, because they are too slow and are recognized by the commerce as not being sufficiently rapid and accurate to give the facts desired, and there is a great deal of difficulty, especially in wheat bought by millers.

The CHAIRMAN. How do you construe in practice this language in the appropriation bill: "To report upon such samples, parcels, or consignments, from time to time." To whom do you make those reports?

Mr. WOODS. To anybody who asks for them. We send out a printed report on all samples, and then, of course, each year we make the report in the annual report of the chief of the bureau to the Secretary as to what we have done.

Mr. LEVER. Doctor, if a dispute arises between a seller of cotton and a buyer of cotton, who is the umpire as to the sample of the cotton, do you know?

Mr. WOODS. We have had nothing to do with that.

Mr. LEVER. You have had nothing to do with that? I happen to know of my own information that the New York Exchange is the umpire. If I sell 20 bales of cotton to a man at Columbia, S. C., and he grades it one thing and I think the grade should be another thing, the matter is sent, I understand, to the New York Exchange, which passes judgment upon it. Now, cotton is almost as big an industry as wheat and grain in some respects; would you think it possible to inaugurate a system of grading cotton such as you have here for grain?

Mr. WOODS. We think it would be possible.

Mr. LEVER. You think it would be possible. Do you think you have the authority under the act, or this particular section here, to do cotton grading?

Mr. WOODS. Not to establish cotton-grading laboratories. We can study the principles that enter into cotton grading, but I think we have no authority to establish cotton-grading laboratories or to grade cotton for the market.

Mr. LEVER. Suppose we inserted the words, "and cotton;" would that give you the authority?

Mr. WOODS. I should think so. The question might arise, though, as to whether or not that referred to cotton seed or cotton fiber.

Mr. LEVER. We could make the language plain.

Mr. LAMB. How do the millers and the buyers and sellers in the great Northwest regard this inspection business, these standards that you have made?

Mr. WOODS. It is not very favorably received by the grain trade, as a rule. They are opposed to it simply because it gets down to indisputable facts in regard to the quality of the sample of grain.

Mr. LEVER. What do you mean by the grain trade? Do you mean the seller or the buyer of the grain?

Mr. WOODS. I mean the grain market.

Mr. GALLOWAY. Everybody opposed but the man who grows it.

Mr. LEVER. The man who grows the grain makes no kick about it?

Mr. WOODS. No; but I expect that the man who grows it, when we tell him he will have to cure his corn in a better way, to reduce the moisture will kick a little about it. But we simply get at the facts whoever they hit, whether they hit the farmer or whether they hit the man who buys or the man who sells.

Mr. LAMB. How about this standardizing received in England or in Europe anywhere where we ship this grain? Do they respect that or not?

Mr. WOODS. Of course it is a very good thing for our export grain trade, although the effect on the export grain trade has not been very noticeable in certain markets. In Baltimore and our eastern markets it has had a very good effect already. At the New Orleans market it has had a very excellent effect, but in some other markets, in Newport News for instance, it has not had a very noticeable effect.

The CHAIRMAN. I was going to ask in that connection, whether exporters, as a rule, are asking for the certificates provided for in this section?

Mr. Woods. Where we have laboratories they are. I think a sample from almost every cargo is sent to our laboratory, especially of corn, where the greatest loss occurs. Our export corn trade has been almost ruined by the moldy corn that has been sent over in the last four or five years.

The CHAIRMAN. Can you tell us whether or not the certificate of inspection which you give helps the sale of this grain when it reaches the foreign market?

Mr. Woods. I can not tell what they do with those certificates.

Mr. GALLOWAY. I think we can say, Mr. Chairman, that the mere fact that there is such a laboratory at Baltimore or at New Orleans does help. In fact, we know that to be the case, for the reason that the people who wanted the laboratory there indicated that sort of thing. That is, these people are striving themselves to develop and maintain a thoroughly honest grain-inspection method or system, and if they do not do it it is owing to the great pressure of quantities of grain that come in at certain times. Where such markets as Baltimore and New Orleans have striven for that certain thing, they have maintained their standards abroad on the strength of what they would do.

The CHAIRMAN. Have you gotten far enough along with those investigations to feel warranted in establishing Federal inspection of grain in the same way that we have Federal inspection of meats?

Mr. GALLOWAY. Yes, sir.

The CHAIRMAN. Do you think you could give grades that would be uniform all over the country, or is it not still largely a matter of individual judgment?

Mr. GALLOWAY. It is a matter, to a certain extent, of individual judgment, but, to use the expression of a gentleman who knows a great deal about it and who has been advocating this, although we have not agreed with him in some respects, it could not possibly be any worse than it is.

The CHAIRMAN. The question is whether it could be any better. I assume that the reasons for the difference in the grading in various parts of the country are purely personal, due to the difference in the men and not due to their moral makeup.

Mr. GALLOWAY. Partly due to that and partly due to the fact that it has been found impracticable for these different organizations to unite on any definite scheme. They have attempted that numbers of times and have always broken away as soon as their meetings or committees disorganized. Hence the theory is, and I think it will be supported by the facts, that if you can get some central agency which will keep up this uniformity, say that such things shall be so and so, and have the power to enforce what it says, you can get uniformity.

The CHAIRMAN. Can you get that uniformity before you have established mechanical methods of getting the grades? At the present status of the trade, will not the personal element enter in?

Mr. GALLOWAY. The personal element will always enter. At the same time, let us assume that this whole thing was thrown on the Department; that it had to do it. The point in my mind is that if that was the case, then, of necessity, we must necessarily develop and establish the factors at once.

Mr. LAMB. The question of judgment enters in but does not control it; is that it?

Mr. GALLOWAY. Yes.

Mr. GILHAMS. I want to ask a question as to what would be a No. 1 grade. You have told us what No. 2 was, but I want to know what per cent of moisture, and so forth, you would have in No. 1?

Mr. WOODS. I was speaking of corn. There is no No. 1 corn. No. 2 is the highest grade corn. In the case of wheat, No. 1 is good, clean, hard wheat; that is, if it is a winter wheat. If it is a spring wheat, No. 1 is simply good, sound, mature, plump berries with a certain definite weight per bushel, varying in the different markets slightly.

Mr. GILHAMS. What degree of moisture?

Mr. WOODS. The degree of moisture for No. 1, so far as our experiments go, I think, should be about 14 or 15 per cent. Of course, the trade does not follow it in per cent. They say "dry," but "dry" means about 15 per cent.

Mr. HAWLEY. I would like to ask a question about the complaints about moldy corn which arose in Europe, or at the foreign markets. Was that due to a surplus of moisture in the corn before leaving this country or to conditions of ocean transportation?

Mr. WOODS. Usually to the amount of moisture in the corn when leaving this country.

Mr. HAWLEY. What per cent is due to that?

Mr. WOODS. I should think 95 per cent is due to the condition in which the corn was shipped.

Mr. HAWLEY. So that the transportation across the ocean is a negligible factor?

Mr. WOODS. If it gets wet it usually happens in loading. Occasionally, of course, there is a little leak in the vessel and there will be a little bit of the corn moldy on this account.

Mr. GALLOWAY. I should say there is a great deal of missionary work to be done in the corn belt to teach the farmers how to handle their corn after it is harvested. If they expect to get the best prices they must handle it so that it will not accumulate this moisture, so that when the time comes to send it to market, especially if the weather is cold, they will not have it filled up with moisture and have it put on board ship and on board the cars in that way, and when the weather gets warm have the water come right out and the corn mold.

Mr. WOODS. When it comes in from the field it contains from 19 to 22 per cent of moisture.

Mr. COLE. Have not these exporters known that for a long while? It is strange you are just making those discoveries.

Mr. GALLOWAY. Those are not discoveries.

Mr. COLE. I should think it would be more important to the exporters to find out about it before it starts on its voyage. It is strange that the exporter would not inquire into the quality and make proper examination.

Mr. GALLOWAY. He does; he has been doing it for thirty years.

Mr. COLE. But you say it has almost ruined the trade?

Mr. GALLOWAY. But that is the question of the honesty of the man who is trying to work that grain off. Let us suppose that thousands

of carloads of grain are pulling into market and that there is a certain standard to be maintained. The inspectors will stretch their consciences—and they are sometimes very elastic consciences—in the rush to the extent of grading up and grading down, just as the occasion may demand. Then this grain goes off to the foreign markets, and the foreigner finds that he has been bitten and complains about the American grain.

Mr. WEEKS. Who pays the inspector?

Mr. GALLOWAY. The inspector is paid usually by the commercial organization. This differs in different places. In Minnesota they have a State inspection service, a very well organized, thoroughly effective State inspection service, but it is only effective within State lines. Chicago has also a similar service. In some places the fees are paid by the chambers of commerce and the inspectors work in cooperation with the chambers of commerce. These inspectors and other men receive high salaries, and while most of them are expert and conscientious men, they are caught, frequently, between two millstones, the people who want to sell on the one hand and the people who want to buy on the other, and they are forced to act in accordance with the dictates of these different organizations, these commercial bodies.

Mr. COLE. And ruin the business?

Mr. GALLOWAY. Ruin the business.

Mr. WEEKS. Do you not think a commercial body would take cognizance of that and try to prevent it?

Mr. GALLOWAY. They do; I do not know how. I never looked up the accuracy of the statement, but the statement was made some years ago on the floor of the Senate that from one elevator alone, more than 6,000,000 bushels of a higher grade of grain went out in four years than went in. It was graded up. It was graded low going in and graded up going out.

Mr. COLE. Your idea, then, is to make this Federal inspection mandatory?

Mr. GALLOWAY. Yes, sir.

Mr. COLE. On all grain that enters into interstate and foreign commerce?

Mr. GALLOWAY. That is our idea. That is what Federal inspection means. It means that the Federal Government shall be the final arbiter in this matter of what the grade shall be and either shall assume the whole expense or by charging a fee shall make the inspection work self-supporting, turning the money back into the Treasury.

Mr. COLE. And what would you have provided if that, in the wisdom of Congress, should be done?

Mr. GALLOWAY. Establish these uniform standards and settle these disputes and react through these various channels of trade back to the man who grows the grain.

The CHAIRMAN. You say that in cities where your laboratories are established there has been a strong disposition shown on the part of the local people to adopt your standards of inspection?

Mr. WOODS. Yes, sir.

The CHAIRMAN. Now, when you have fully worked this matter up until you do reach the point where you can inspect grain with absolute accuracy, is it not likely that your standards will be taken

all over the country, and when they are so taken, is it not reasonable to believe that the inspection would be just as satisfactory as it would be found if conducted by your bureau?

Mr. GALLOWAY. I think that is likely; that was our opinion.

Mr. WEEKS. How long do you think it will take you to perfect your apparatus and arrange for this standardizing of grades?

Mr. GALLOWAY. That is a somewhat difficult question. Probably we ought to have laboratories at the different centers representing the different conditions under which grain is grown. That would probably mean four or five men, as estimated for. The standards of grain are standards that must have a certain range of elasticity, depending upon the seasonal conditions. That is a feature of the Canadian service now. The Canadian people have a national grain inspection in operation, and have had it for some time, and it is working in a perfectly satisfactory way. They fix the standards once a year and put up those standards in samples in such a way that they are in sealed receptacles. They are placed at the grain centers and the inspectors use them for reference in all cases of dispute. The standard, for instance, for a certain kind of wheat in a certain season will be off certain points another year, depending, in a measure, on the conditions under which that wheat was grown. The amount of moisture depends, to some extent, on the water conditions.

The CHAIRMAN. Then you are of the opinion that even after the problem has been worked out it will be necessary for the Government to maintain these laboratories?

Mr. GALLOWAY. A certain number of standardizing laboratories, just as we maintain a bureau of standards for other things.

The CHAIRMAN. Why would it not be cheaper and the results be just as satisfactory to have a central laboratory in Washington, for example, and ship your samples from the various markets?

Mr. GALLOWAY. Because the samples change very quickly in shipment, and it is almost impossible to get the grain from any distance.

Mr. LAMB. It will dry up in shipment?

Mr. WOODS. It would not be quick enough, either.

Mr. GALLOWAY. If there are thousands of carloads of grain standing on a track, they have to be gotten out right away and not block the markets. That seems to me to be the great question to meet, this great commercial proposition of rushing these things on their way to markets and at the same time maintaining the usual Government supervision, the kind of supervision the Government ought to give.

Mr. LAMB. Are you proposing to establish laboratories at Kansas City and these other points in response to local demands?

Mr. WOODS. Yes, sir.

Mr. LAMB. Who asks for them?

Mr. GALLOWAY. Boards of trade, chambers of commerce, and other organized bodies.

The CHAIRMAN. It seems to me if they ask for this they can not be hostile to the work, as you indicated they were.

Mr. GALLOWAY. They are not hostile to this work. If that statement was made it is a mistake. They are not hostile to this laboratory work. In fact, they had been working in harmony with it until the national grain inspection work began to be agitated. Now, the general feeling is that they do not know what is coming. If federal inspection is coming they want to know it. They naturally think

that federal inspection is against their privileges and prerogatives, and they are opposed to it.

The CHAIRMAN. Would the expense of maintaining these laboratories at the various points continue to increase from year to year, or do you think that after a while you would reach a maximum beyond which you would not need to go?

Mr. GALLOWAY. I think the maximum is practically reached in the sum of about \$5,000 and you would not need to go beyond that.

The CHAIRMAN. I see in almost all of these places where you had laboratories last year, you spent from 50 to 100 per cent more than that.

Mr. GALLOWAY. More than \$5,000?

Mr. WOODS. The average was \$3,500 to \$4,500.

The CHAIRMAN. This is at Washington; you are right. I was looking at the Washington bureau.

Mr. GALLOWAY. That is certainly more expensive, because we include the salaries of our chief men.

Mr. LAMB. If I understood you right, you have got the question of moisture pretty well established.

Mr. GALLOWAY. We have the question of moisture pretty well established, but we have improvements there still to make. We will eventually get in apparatus, either electrical or some other kind, to enable us to find out the moisture in the grain.

Mr. WOODS. To determine it in the car.

Mr. GALLOWAY. We are working on that now, but we are not ready to make any statements on that yet. But if we can get the thing into operation we will be able to help the work in such a way that there will be no blockade in commercial operations.

Mr. WEEKS. Is this grain inspected at more than one place? Suppose you would inspect grain at Duluth that is to be shipped to Baltimore. Is the standard that is determined at Duluth of any value in Baltimore?

Mr. WOODS. Certain factors would be, but moisture content would not be.

Mr. GALLOWAY. The question the gentleman asked was whether these other organizations would recognize the grades fixed at points from which the grain started.

Mr. WEEKS. If you had your own inspection service.

Mr. GALLOWAY. Oh, yes; in that case it would be, because we would never inspect grain except where it was unloaded; only at those points.

Mr. WEEKS. It comes in by rail to Duluth and is unloaded; then it is shipped off.

Mr. GALLOWAY. It is inspected again.

Mr. WEEKS. So the standard at Duluth is of no value on the coast?

Mr. GALLOWAY. No, sir; the grain should be inspected each time it is unloaded. That is the only way you could handle it, because the Government could not expect to handle the small cargoes of grain coming into the small towns; it would be simply the large cargoes at certain commercial points, probably 25 or 30 points. We would handle probably 95% of the grain that is shipped in interstate commerce.

Mr. HAWLEY. The only factor would be the amount of moisture, the amount of dirt, and so forth?

Mr. GALLOWAY. The only important factor.

The CHAIRMAN. Have you had any case in which a dispute between buyer and seller has been referred to you?

Mr. GALLOWAY. That is done frequently at our Baltimore laboratory.

The CHAIRMAN. Is your verdict accepted?

Mr. GALLOWAY. Suppose there comes up a question of corn grade, and the chairman of the corn committee, as they call it over there, in the chamber of commerce says, "This corn is wet, contains 16 or 18 per cent of moisture"; suppose that is not accepted by the men who have handled the corn, and the corn committee is called into the case—the corn committee is supposed to be a committee of arbitration—and they can not agree with the inspector. They take it up into the laboratory and in ten or fifteen minutes they have worked it out definitely.

Mr. COLE. Is there any demand for testing wool the same as you test corn?

Mr. GALLOWAY. There is considerable demand, but there has not been any advancement made in that.

Mr. COLE. If you branch out on the wool, do you not think the wool growers would ask you to inspect wool in a short time?

Mr. WOODS. I do not know; they might. It was our idea, of course, in establishing these grain-inspecting laboratories that we would not have to have a Government inspection of grain; that we could establish Government standards and they would be just the same as a yardstick. We believe that certain simple, quick, mechanical processes can be worked out that are applicable by any honest person, and when we get those worked out anybody ought to be able to use them. But there is a big difference of opinion on that subject.

Mr. COLE. If you had a mechanical process, the buyer would insist upon examining the quality before he bought, and the seller before he sold, and there would be no agreement.

The CHAIRMAN. I do not think I risk anything in suggesting that the sentiment of the committee is to the effect that their view would be entirely fulfilled if you continued to work along the line of establishing some quick mechanical means of making inspections.

Mr. WOODS. That is all we are doing now.

The CHAIRMAN. And we would like to hear anything further you have to say on that.

Mr. WOODS. I have nothing further to say.

The CHAIRMAN. If there are no further questions we will let Mr. Woods pass on.

Mr. GALLOWAY. Mr. Woods has practically completed what he has to say on three series of projects, and I am going to attempt now to round out a few more. We have had so much plant industry that I am afraid you are getting tired of it. In conclusion, I will mention briefly, first, some investigation we are conducting with the sugar beets, having as its object the improvement of the sugar beet with reference to the sugar content; second, the study of the diseases of the sugar beet; and, third, the production or the kind of beets which will eliminate a lot of trouble in the planting and handling of the crop. With regard to the question of sugar-beet seed, I will say that all of our sugar-beet seed, or practically all of it, is imported. We are dependent absolutely on foreign governments for the seed from

which we grow our beets. That does not seem to be the proper thing, and for several years we have been endeavoring to establish the seed-growing industry here. To do that we must find out where we can grow the beet seed most successfully and produce a beet with a large percentage of sugar in it. The average per cent of sugar in the beet is something like 11½. We have beets that have produced as high as 24 per cent. Even an increase of 2 or 3 per cent would be an increase in the total tonnage of sugar.

Mr. GILHAM. I would like to know why we are not raising our own seed beets.

Mr. GALLOWAY. It has been considered impracticable to raise seed, but that is an erroneous idea. We can grow as good seed here as anywhere, and better; but finding the climatic conditions where these seeds can be most profitably grown is a question. That we are endeavoring to do. Our best seed is now grown in Washington State, but we are growing good seed in other sections, and the question of the seed has to do not only with the quality, but with the ability to harvest the seed. Washington, over on the dry side of the mountains, has proved a most excellent place for the production of this beet seed, and a gentleman who has gone into that business there, after being convinced through the work we conducted at his place, has already produced from 75,000 to 100,000 pounds of high-grade seed and is selling that every year. We are constantly working, however, toward a higher sugar-producing beet.

The diseases of beets I can simply briefly refer to. They are being studied in the laboratory, and the application of remedies is being made in the field. We are also working with a view to finding out methods of increasing the tonnage of beets through better cultural methods and the use of fertilizers, where such are available, in certain sections of the United States.

One of the most interesting propositions is the production of beet seed that will give us only one germ. The ordinary beet seed is a composite body, which gives us four or five germs. The seedlings, or beetlets, grown from that beet seed make necessary a very expensive process of thinning, and in order to overcome that problem of labor, which is an important one and which we have to consider in all these industries, we began three or four years ago to select beets with reference to getting a type which will give us a root of high sugar content and one that will give us a seed with only one germ. We have here some of that seed which has been grown by Doctor Townsend, who is working up this matter. We started out by getting about one seed in two thousand that had a single germ, and now we are getting about 40 or 50 per cent.

Mr. LAMB. How much have you got?

Mr. GALLOWAY. So far the quantity is necessarily small, because we have had to work not only for the single germ, but to maintain the sugar content and tonnage per acre. We have not let any of it out, because it is not ready to go out.

Now, that is what we are trying to do. When we get that, our idea is to take a machine such as is now used in cotton planting or corn planting, and we will be able to drop a single seed in rows, using machinery that will probably save a quarter of a cent or a half of a cent to the pound, and that is an important consideration when we come to consider the sugar-beet industry as a whole.

Mr. LAMB. At what per cent of sugar content can the farmer afford to raise the beet; 12 per cent?

Mr. GALLOWAY. Twelve per cent, yes—possibly 11 per cent.

Mr. LAMB. Now, you have, I know, had some from the James River country; do you recollect what per cent it was?

Mr. GALLOWAY. We had some beets there with a high per cent; some ran 12 to 14 per cent.

Mr. LAMB. It was 12 or 14 per cent.

Mr. GALLOWAY. It is not so much a question of a high sugar-yielding beet as it is to get the farmers generally to go into the industry, and it is a question, too, I understand, Colonel Lamb, of tonnage, of getting all of the total tonnage put where it will be profitable. In the warmer climates the tonnage seems to increase.

The CHAIRMAN. I would like to ask one question. It applies to a great many other of your projects here, as well as to this. I notice you have one project for the improvement in the methods of growing sugar beets for which you estimate an increase next year of about \$500. Why can not that experiment proceed on the same scale as at present and get just as good results?

Mr. GALLOWAY. Well, it might, possibly. It is simply a question of the extension of the project, as to whether we shall extend the work over more territory or concentrate where we have been and develop along the lines where we have been developing.

The CHAIRMAN. The question I had in mind was that in a great many of these investigations where the results, as yet, are entirely problematical, it would be just as satisfactory to proceed on a moderate scale as it would be to increase it 50 or 100 per cent every year.

Mr. GALLOWAY. That would apply more particularly to such projects as this one here, but not to cultural questions which are already pretty well understood, the getting of which more generally into practice simply means extending them over more territory and into the hands of more people.

Mr. COLE. There is a good part of the section of Ohio that I live in that has a good sugar-beet climate, but there are a great many farmers who refuse to go into the business for fear that it will exhaust the soil too rapidly. Is that a fact, that it does exhaust the soil rapidly?

Mr. GALLOWAY. It does, unless it is rotated with some other crops.

Mr. COLE. What other crops should be rotated with it?

Mr. GALLOWAY. It depends upon what soil the beet is raised in. In the West the sugar beet is frequently rotated with alfalfa. In Ohio it could be rotated with the ordinary crops, taking grass or clover for one of the series of rotations. The difficulty right there is that the sugar beet is generally found to be quite a profitable crop and the farmer is loath to give up such a crop to rotate. That is, he wants to get all out of it he can. It is the same old story we have with other crops, with cotton, with potatoes in certain parts of Colorado. In certain parts out there the land is so rich that they have not had any particular difficulty with fertility except where they do rotate with alfalfa on short rotation.

Mr. COLE. Do you think it should be rotated once in every three or four years?

Mr. GALLOWAY. I think in portions of Ohio where these shorter crops could be grown, the sugar beet would enter very profitably into a four-year rotation, bringing in oats or corn and grass with the beets. The sugar beet acts as a cleansing crop, leaving the land in excellent condition for grass, and it would be followed by the general plan of plowing for corn.

Mr. LAMB. They can fertilize?

Mr. GALLOWAY. No, they can not fertilize year after year and grow beets without adding humus.

Mr. LAMB. Except in these old gardens; I know where they have raised crops for many years.

Mr. GALLOWAY. That is a very rich soil. I should like to say a few words in regard to our fruit investigations, a very important line of work. I am not taking these up in order, Mr. Chairman, now; I am just going through rapidly. We have our fruit work divided into several main lines of projects. First, we maintain here a central organization which does a great deal of work in the matter of identifying fruits that are sent in and giving information on cultural matters and other things that would necessarily go with such work. Then we have our field investigations, which have for their objects primarily the study of conditions affecting the harvesting, storing, marketing, and shipment of fruits. We have been doing a considerable amount of work in this direction on the Pacific coast, and are extending it gradually to regions where deciduous fruits are grown.

We have made our most rapid advances in the citrus growing regions, because there we have a very intensive industry, a well-organized force and support, and a readiness on the part of all interested to join with us in cooperative effort. There are between 28,000 and 30,000 carloads of oranges shipped from California, and the loss in the shipment across the country will sometimes aggregate 25 to 30 per cent from rots and other diseases. Our work in the field has been to find out the causes of these rots and to point out methods of preventing them. The work has yielded concrete results. In fact, the results have been so conclusive in many respects that I think, so far as the orange work is concerned, we will be able to wind it up this year or the next. The packing houses have taken hold of it, have adopted our methods, and I think it is a conservative statement—indeed, the statement has been made by the men out there themselves—that that work alone in southern California has brought them an increased value to their fruit and a saving of \$1,500,000 to \$2,000,000 a year. Just one little point, showing how simple these things are. The chairman came down and talked with Mr. Powell, who has charge of this work, and after he had talked with him for over two hours his question was why in the world the people had not seen it and adopted it before. The orange, when it is taken from the tree, is clipped by means of clippers. The work is done very rapidly, and in clipping the fruit the skin is punctured frequently by the clippers. The relation of that fact to the matter of the rots in the oranges was entirely overlooked by the growers until Mr. Powell made the demonstrations, proving to them that the clipper-cut fruit would easily have kept any length of time if they had not clipped it. Trials were made right there on the fruit; boxes of fruit were packed, clipper cut and nonclipper cut, and then that proved it conclusively.

On that trial the fruit was sent across the country, and our men at New York inspected the fruit and reported back both as to the clipper cut and the nonclipper cut, and the injury ran from 25 to 30 per cent of the clipper cut to about 1 to 2 per cent of the other. The organizations in California were immediately notified of this matter and took steps at once to remedy the difficulty by simply turning up the points or blunting the points of the clippers. That thing alone resulted in one year, according to Mr. Chase, who handles about 2,000 acres, in a saving to him of about \$17,000. It has been demonstrated that that is one cause of the loss, but there are many other causes, such as the methods of handling, the methods of packing, and the use of different kinds of packages, which were all taken up with the view of increasing the efficiency of the fruit grower and bringing back more money to him.

The work that we have been doing with deciduous fruits has been confined mainly to fruits grown on the Pacific coast, but we have also made many cooperative and trial shipments of apples abroad, with the result that our trade in foreign fruits has been developed materially. We have also made a number of experiments and shipping tests with a view to demonstrating the fact that the fruits grown on the eastern seaboard could be shipped to foreign markets and sold at a handsome profit. The keeping qualities of fruits have also been under investigation, the idea being to work out the important question as to the keeping of fruits. Such fruits as apples, especially, harvested at different times, behave very differently when placed in cold storage, and as cold storage is becoming an important matter in connection with fruits, it seems desirable to investigate these questions. We are doing that, and have published several bulletins on the best methods of harvesting and handling different kinds of fruits, and so on.

Just a few words in regard to the work we are doing on good seed for the farmer. The farmer is, we all think—probably the committee think—the most downtrodden of men. He must submit to all sorts of indignities, and among other things he must frequently buy seed and pay for seed that is not what he wants and what he buys or pays for. We import, so we are reliably informed, something in the neighborhood of 600,000 pounds of Canadian bluegrass seed annually. I say that we import, I mean that the United States imports, that quantity of Canadian bluegrass seed for purpose of adding it to Kentucky bluegrass seed in order to sell the adulterated product at a lower price than the ordinary Kentucky bluegrass seed. Canadian bluegrass seed sells for about 3 cents, and the other seed for about 10 or 12 cents.

To help the farmer in all those things we now have here at Washington a laboratory that examines the seed for him and will report as quickly as possible the quantity of this material that is found in the sample that he sends. In order to hasten that work we have recently established a laboratory at Lincoln, Nebr., and are desirous of establishing two others. We would like to have one in Missouri which will draw samples from the southern portions of the country, where they use a large quantity of forage crop seed; one at Lincoln, which will take care of the alfalfa question; and one on the Pacific Coast, possibly in Washington or Oregon, where the condi-

tions are different. The farmers will be encouraged to send their samples to these laboratories, and they will get a quick statement as to the contents of the seed. We have an arrangement whereby we secure statements as to all these importations, and under an authorization given us by Congress two or three years ago, we gather samples of seeds from all over the country—buy them in the market, through our special men—and wherever we find adulterations we publish names and give the adulterants and the amount of the adulterations. We have published now four or five of those circulars, and it has had a very beneficial effect as a whole. Here are some samples of the seeds that are used for adulteration purposes. Orchard grass, among other things, is largely used to mix with the Kentucky bluegrass; alfalfa is adulterated with various kinds of seeds resembling alfalfa, and clovers are adulterated. Besides these adulterations we find these bad weeds, which are quite a serious thing.

The bureau has also made some recent investigations with regard to the quality of the commission seeds that are sent out all over the country in small packages and sold at the corner groceries. Last summer our seed laboratory secured samples from about 35 different firms—and I just had placed in my hands today a Farmers' Bulletin which gives the results of the examination of these samples. It showed in a great many cases that these seeds are old and are probably repacked. At the same time the seed laboratory has given a comparative table showing the germination and purity of the congressional seed as compared with the seeds that are put up and sold in these packages. I might say that the Congressional seeds show up very well, despite many things that have been said about the poor quality of those seeds.

Mr. LEVER. I heard the statement made by a seedsman while I was at home during the holidays that the old, left-over seeds for the year were sent to Washington and bought by the Department.

Mr. GALLOWAY. That is absolutely not the case; it could not be the case because if they were sent here they would be sent back as soon as they were tested. We have, I think, the best organized system of securing and testing seed in the United States, if not in the world. We are absolutely independent; we do not have to carry our seed over from year to year; we get rid of it every year. We send it out every year. We test for vitality every lot of seed that comes into our laboratories, and we send those out every year. But if they do not have the vitality they are rejected, and if they are not true to the type we do not pay for them.

The CHAIRMAN. Have you been able to get the seeds provided for by the emergency appropriation?

Mr. GALLOWAY. Yes, sir. We have not been able to get all the kinds that will have to be gotten, for the reason that it was so late that we could not get them, but we have gotten most of the kinds and will be able to supply the seeds on time, although we have been delayed six weeks on account of the fire.

The CHAIRMAN. Did you buy them from the seedsmen?

Mr. GALLOWAY. Yes, sir.

The CHAIRMAN. The current appropriation bill sets apart one-sixth of all the seeds purchased under the Congressional distribution for the use of the Secretary.

Mr. GALLOWAY. Yes, that is about 1,000,000 packages.

The CHAIRMAN. How does he distribute those seeds?

Mr. GALLOWAY. He distributes them to Members of Congress and Senators in the order in which they are asked for, as a rule.

The CHAIRMAN. How many would he use for other purposes?

Mr. GALLOWAY. For current purposes?

The CHAIRMAN. Yes.

Mr. GALLOWAY. We use 100,000 for the Bureau of Statistics, 15,000 for the Weather Bureau, and about 100,000 to 120,000 miscellaneous, making about 300,000 in all.

Mr. LAMB. The Secretary has how many?

Mr. GALLOWAY. He has 1,000,000.

Mr. COLE. They are distributed in the order asked for; that is, the man who gets in his request first gets the biggest supply?

Mr. GALLOWAY. No, not the biggest; we try to divide it up as evenly as we can.

Mr. HAWLEY. Doctor Galloway, do you also raise any portion of the seeds that are distributed through the Congressional distribution?

Mr. GALLOWAY. No; we raise them in this way only. They are in part grown under our supervision.

Mr. HEFLIN. And you test these seeds?

Mr. GALLOWAY. Certainly.

Mr. HEFLIN. And select the best you can?

Mr. GALLOWAY. The very best.

Mr. WEEKS. How many reports do you get, all told, from this Congressional distribution of seed?

Mr. GALLOWAY. I kept a record one year, the year before last, I think it was, and made a statement last year before the committee; but it was a very small number.

Mr. WEEKS. About a thousand, or five hundred, or one hundred?

Mr. GALLOWAY. Oh, it was more than that; we get in all, taking the year through, five or six thousand reports. That does not include, however, the reports on the phases of the work where we make what might almost be called a personal request of the recipient to report back, such as in the cotton seed and alfalfa seed distributions, and special distributions of that kind, which I am going to refer to in a minute.

The CHAIRMAN. Are these reports mainly from people who are dissatisfied with the seeds and send in to complain?

Mr. GALLOWAY. Not mainly; it is the other way, though there are some very strong statements sent in, sometimes, in the matter of complaints, or simply generalities.

Mr. COLE. I got a report on one package last year, only one.

Mr. RUCKER. Do any of the recipients return them to the Department?

Mr. GALLOWAY. If any of the seed has ever come back to the Department it has not been in my experience.

Mr. HAWLEY. You say that these seeds raised for Congressional distribution are raised under your supervision?

Mr. GALLOWAY. Not all of them.

Mr. HAWLEY. And those that we are going to send out for Congressional distribution have all been tested?

Mr. GALLOWAY. They have all been tested or will be tested; we will not let a seed go out without having been tested. We have got to

put up about 38,000,000 packets in a comparatively short time, and we do it all by method and system and by machinery, and as seeds come in, in different lots, samples are immediately taken by our laboratory men and tested.

Mr. COOK. How about the seed for the arid regions; from what country are the hard wheat seeds gotten?

Mr. GALLOWAY. We are getting those hard wheat seeds from some of the higher elevations of Russia, and we are getting them from other sections also.

Mr. RUCKER. How much increase are you asking for garden seed this year?

Mr. GALLOWAY. We are not asking for any increase for garden seed.

Mr. RUCKER. Do you not think you ought to have \$100,000?

Mr. GALLOWAY. Judging by the requests, we ought to have that sum. With respect to the seed business I will say that we have the work divided into three main groups; first, the Congressional distribution; second, a general distribution of striking, new, and valuable seeds in the way of forage crop seeds and cotton seeds; and, third, the distribution of seed that we obtain from foreign exploration, and a great many things we have discussed, such as durum wheat, have been built up by this sort of work.

The CHAIRMAN. Referring to explorations, I notice you estimate \$17,100 for that work, and you ask for an addition for the next year of \$5,000.

Mr. GALLOWAY. We have asked for an increase of \$5,000. The Secretary was anxious that we should have \$5,000 to make a special effort to secure from the higher, drier sections of Siberia and Russia a number of these new dry-land seeds that Professor Hansen discovered when he was last there, but which he brought home only in small quantities. He is testing those things at the South Dakota station and other places, and some of them are proving of excellent promise. The Secretary's idea is that the time is ripe to have Professor Hansen, who has been there a number of times and has had large experience there, go right back to Siberia and Russia, if he can make arrangements to get away from his institution, to secure seed in sufficient quantity to make a distribution throughout the western semiarid region. He has found a new alfalfa and a number of other new forage crops. That is what that \$5,000 is intended to be used for.

We would also use a little of the increase that is asked for in connection with our general forage crop propaganda work. That is all conducted in connection with the Congressional seed work. We are spending now something like \$20,000 for the forage crop work in this way. We are trying to extend alfalfa throughout the humid section; we are extending alfalfa in the northwestern section, and we are doing all that in connection with individual people in the individual and respective States, working sometimes with the stations—mostly with the stations—but sometimes without the cooperation of the stations. Members of Congress are frequently getting requests from their people for some crops to help them out in some peculiar situation, a new forage crop, or something of that kind.

Our system of handling that question is, briefly stated, this: We do not send them seed promiscuously, but if they give us the name of

the farmer we will give him the seed to make the trial of the new thing or plant that is going into a new section of the country, and we will follow that up frequently by having one of our men, or one of the station men, visit his section and see what progress he is making with the work. In that way we have planted alfalfa throughout a number of the Eastern States and are putting in other crops, such as the cowpea and the kinds of legume needed, for the rice country, new kinds of forage crops for the extreme Northwest, extending the clover area up into that region, and in other ways adding to the value of our agricultural productions, mainly through this scheme of dealing with the people through the Members who make these requests, and instead of sending out a little batch of seed which would not do anybody any good we send out a special batch of seed, and with it the request for information.

The CHAIRMAN. Can you tell us what part of the appropriation for seed distribution you spend, or will spend this year, for the introduction of really new and valuable dry-land agricultural seed?

Mr. GALLOWAY. We have a total appropriation of \$238,000 for the whole seed work; we spend, in round numbers, \$161,000 on the Congressional distribution, and about \$25,000 for the forage crop work; \$4,000 of the \$161,000 is spent for cotton; \$6,000 to \$8,000 for miscellaneous things, including vines, bulbs, sugar beets, etc., and \$37,000 for the foreign introductions and the building up of the industries we have already established here through foreign introductions. Those are general figures. I am speaking from memory, but that is about the way the thing runs. I may say that when this work was turned over to the Bureau of Plant Industry eight or nine years ago, the appropriation was all going for Congressional seeds and the Members were getting the same number of packages that they are getting to-day. By the adoption of strict business methods, the elimination of the middleman, and the buying of the seed by the Department itself, we have been able to maintain a high standard of quality in the seeds and send out as many packages and at the same time introduce these other side lines that we mentioned.

Now, gentlemen, I believe we have run pretty nearly through all of our work, and we have given you the most salient features of it. I can only say that Mr. Woods and myself represent only a small portion of the bureau, so far as the men are concerned, and the work could have been much more interestingly explained if it had been presented by the men themselves. But I think—in fact, I know—that the Secretary and all of us would be glad to have you come down and talk to these men about these things. Mr. Scott your chairman and Mr. Lamb have been down and they know something about it.

In conclusion, I must thank you for the very courteous treatment that we have received and for the patience with which you have listened to what we have had to say. [Applause.]

The CHAIRMAN. I am sure we feel under equal obligations to Doctor Galloway and to Doctor Woods and their associates for the patience they have exhibited and the great amount of information they have given us.

Thereupon, at 10 o'clock p. m., the committee adjourned until Thursday, January 23, 1908, at 10 o'clock a. m.

COMMITTEE ON AGRICULTURE,
HOUSE OF REPRESENTATIVES,
Thursday, January 23, 1908.

The committee met at 10 o'clock a. m., Hon. Charles F. Scott (chairman) in the chair.

STATEMENT OF MR. GIFFORD PINCHOT, CHIEF OF THE FOREST SERVICE, DEPARTMENT OF AGRICULTURE.

The CHAIRMAN. We have met this morning to consider the estimates for the Forest Service, and I have asked Mr. Pinchot, the Chief of that Bureau, to come before us. I believe, perhaps, it would expedite business if we would ask Mr. Pinchot to go over the estimates first in detail instead of taking up for discussion in a general way the work of his Bureau.

Mr. PINCHOT. Would you prefer that, or would it be wiser for me to give you a general idea of the work, as to what the estimates are for, and what they cover? Just as you prefer.

The CHAIRMAN. I really believe we had better run over the estimates here first. I hope some other members of the committee will come in before we get through, and most of your appropriation is in a lump sum, anyway.

Mr. PINCHOT. Most of it is.

The CHAIRMAN. And it is touching the expenditures of the lump sum that you will take most of your time?

Mr. PINCHOT. Yes, sir.

The CHAIRMAN. What I wanted to call your attention to now is the increases submitted in your statutory roll. I notice first one clerk, an increase of \$100 submitted, bringing the salary up to \$2,000. That is simply a promotion in salary?

Mr. PINCHOT. These are simply promotions in salary. We adjusted the statutory roll to meet the condition of affairs which we expect on the 1st of July. In other words, we tried to forecast the necessary promotions of the 1st of July in the statutory roll.

The CHAIRMAN. Your Bureau does not seem to have a chief clerk?

Mr. PINCHOT. No; we find ourselves very much better off without a chief clerk. We have tried it with a chief clerk, and we have come to the opinion that a chief clerk is mainly in the way.

The CHAIRMAN. Will you illustrate that proposition a little bit. It is something in the nature of news to this committee, I fancy.

Mr. PINCHOT. We find that the business of a chief clerk generally is to manage the clerical work of a whole bureau. Now, we find it very much wiser to have the clerical work in each division of the Bureau managed by the chief of the division. He gets a great deal better work out of his own people, whose work he is responsible for and whom he is continually pushing, than is possible, in our judgment, by centering that clerical work in one man.

Mr. HAWLEY. Then I understand that instead of having one chief clerk you have several?

Mr. PINCHOT. No.

Mr. HAWLEY. That is, one man at the head of each division?

Mr. PINCHOT. The man who manages his division on that chart [indicating] is responsible for the work under him.

Mr. HAWLEY. He is really a chief clerk.

Mr. PINCHOT. He is a chief clerk, incidentally, but he is a great many other things; a forester, a draughtsman, or an engineer, or whatever else he may be. It is his business to get results in the office—that is, the line of work of which he is in responsible charge—and he is therefore in charge of his entire office force.

The CHAIRMAN. For instance, Mr. Potter, whose name appears here in charge of the general grazing branch of your Bureau, himself looks after the work of the clerks of that branch?

Mr. PINCHOT. He keeps very close track of them.

The CHAIRMAN. And the same system prevails throughout?

Mr. PINCHOT. Yes, sir; throughout. May I make one qualification there? In a service with so varied duties as ours, each taken care of by a special part of the organization, and with a volume of business that varies greatly at different times of the year, as ours must, there has got to be some kind of provision for extra demands. For instance, the branch of grazing needs more in the spring than it does the rest of the year, and so on with the rest of the work, the stress varies at different times. We can not supply grazing with clerks enough to run their business when they are carrying their peak load, so to speak, and keep those people idle, or comparatively idle, the rest of the year, so that we have a sort of reservoir of clerks in the office of maintenance, from which the various branches draw. For instance, if there is a special demand for computing, certain clerks whose duties most of the time may be addressing envelopes, or whose duties are not pressing, are taken out of that reservoir, and as soon as they go back there is a standing job awaiting them. In that way we keep in each branch and office just as much help as is necessary to do the current work, and no more.

The CHAIRMAN. And this increase is simply in pursuance of your general plan to provide a flow of promotion?

Mr. PINCHOT. That is exactly it.

The CHAIRMAN. Then, you ask for an increase of a number of clerks of four, due to the increasing growth?

Mr. PINCHOT. To the increasing growth, and in particular to the heavy work which agricultural settlement has imposed upon us.

The CHAIRMAN. You mean to the increasing number of homesteaders who are going to the public forests?

Mr. PINCHOT. Yes, sir; there is a good deal of clerical work due to that. There is also a growing amount of work in accounts.

Mr. WEEKS. How competent are those clerks? What can they do? Have they any technical knowledge?

Mr. PINCHOT. Not of forestry; but those who are employed in "settlement" must have a good deal of knowledge of land law and of procedure of the General Land Office. The clerks in "computation" are expert computers. The clerks in "drafting" are draftsmen. We have almost no clerical work in the Forest Service comparable with what usually goes under the title of clerical work in other bureaus, except the general envelope addressing. I think it is fair to say we have a greater proportion of experts in the Forest Service than in any other service I am acquainted with.

The CHAIRMAN. Do you mean to say that your clerks who draw a salary of \$2,000 do something else besides clerical work?

Mr. PINCHOT. A very high grade of clerical work, requiring special knowledge.

The CHAIRMAN. I notice you have transferred one of your \$1,000 clerks to the Secretary's roll.

Mr. PINCHOT. We have from time to time been obliged to help out the Secretary's office, especially the office of accounts, which is a fair thing to do because they do so much work for us. But the Secretary, as I understand it, is endeavoring to get every clerk paid where he works.

The CHAIRMAN. That is the theory?

Mr. PINCHOT. Yes.

The CHAIRMAN. I would like to inquire just a little further in regard to this. If the Secretary needed this clerk why could not he get him through the usual channels, instead of asking for him from your Bureau?

Mr. PINCHOT. The difficulty is, Mr. Chairman, that the appropriation bill is only made once a year, while new situations keep constantly arising with the growth of the work. For instance, the work of the Forest Service is growing very rapidly, and this entails additional burdens on the Secretary's office, and particularly on the Division of Accounts, and in order to carry the work we have had to help them out from time to time.

The CHAIRMAN. This means that you have sent one of your clerks already to the Secretary's office, and are paying him from your appropriation?

Mr. PINCHOT. To work, however, upon matters concerning the Forest Service.

The CHAIRMAN. And yet you do not expect to carry him on your rolls after this year?

Mr. PINCHOT. No.

The CHAIRMAN. You expect that he will be paid from the Secretary's roll hereafter?

Mr. PINCHOT. I think it is something of a question which place he really ought to be paid from, because in both cases he is doing work on forest business.

The CHAIRMAN. You remember, I think, from what you just said, that some three or four years ago this committee discovered that there had been some sort of miscellaneous practice of transferring clerks from one bureau to the other, and that we found a large number of clerks engaged in one bureau that were really paid from the appropriation of another?

Mr. PINCHOT. Yes.

The CHAIRMAN. And we requested that that practice cease?

Mr. PINCHOT. This is not analogous to that, Mr. Chairman, as I understand it.

The CHAIRMAN. Below you submit an increase of \$200 to the salary of a draftsman, which brings him to \$2,000.

Mr. PINCHOT. That, I think, is an increase thoroughly well deserved. Before you gentlemen are through with me I want to show you samples of the drafting work, and the amount of drafting work, that is being done in the Forest Service. We have about 180 national forests, of which very few are already mapped. Our boys in the field prepare sketch maps, maps of forest conditions of one kind and another, and the drafting work of the service is very heavy. Mr. Kolb, who has charge of it, is of extra high grade, and I think thoroughly deserves the promotion.

The CHAIRMAN. Do you know how that salary compares with the salaries of draftsmen employed in other bureaus?

Mr. PINCHOT. I should say it was just about on a par. Mr. Kolb, however, is doing much higher work than the ordinary draftsman, because he has charge of a large number of men.

Mr. HAWLEY. Take the fourth item there, one increase in the number of clerks in class 4; what was the necessity of that additional clerk? That is on page 21.

Mr. PINCHOT. Six clerks of class 4?

Mr. HAWLEY. Yes. What was the necessity of that additional clerk?

Mr. PINCHOT. A very large increase in the clerical work involved in agricultural settlement and accounts, and in this drafting work. You see, we have undertaken the management of an enormous area of the country, and the use of it by the people of the West is increasing with tremendous rapidity. It is fair to say that each year the use of the national forests surpasses the use made for all previous years, and naturally we have got to keep up with this work.

The CHAIRMAN. If you had not transferred your \$1,000 man to the Secretary's roll, would you still have to ask for an increase in your class 4 clerks?

Mr. PINCHOT. Yes, sir.

The CHAIRMAN. It is not a promotion from \$1,000 to \$1,800?

Mr. PINCHOT. No, sir; it is not.

The CHAIRMAN. Unless you have something further to offer, or any member of the committee has any more questions to ask, we will pass from the statutory roll and let you proceed in your own way on the work of your Bureau and give your reasons for whatever recommendations you want to make.

Mr. BEALL. Before you begin, are there any other instances in your office where clerks are carried on your pay roll that are on work in some other office?

Mr. PINCHOT. I think not. I think that is the only case.

Mr. Chairman, I have distributed small copies of this chart of the Forest Service to the members of the committee, and with your permission I will describe briefly how the Forest Service got to be what it is and the work it is doing. In 1876 the first Government work in forestry was undertaken by the appointment of one man in the Department of Agriculture to investigate and report. That was Dr. Franklin B. Hough. Out of his work grew in 1882 the old division of forestry, which continued from 1882 until 1901.

The CHAIRMAN. As a division of the Interior Department?

Mr. PINCHOT. Of the Agricultural Department.

The CHAIRMAN. Of the Agricultural Department?

Mr. PINCHOT. The forest work began in the Agricultural Department. That division, the old division of forestry, reached an appropriation of about \$35,000 a year, and then fell back, and when my connection with it began in 1898 the appropriation was \$28,520, as I shall never forget. It was increased that year to about \$40,000. While the division of forestry was practically stationary the act of 1891 was passed, under which the President was given authority to set aside forest reserves, or national forests as they are now called. The management of these forests remained with the Land Office. President Harrison set aside the first forests, and he was followed

by Cleveland, and so on, and pretty soon we had the condition of all the national forests being in the charge of the Land Office and of the foresters being in the employ of the Agricultural Department, and neither having anything to do with the other. An attempt was made, extending over a number of years, to end this thing by getting the two branches together, and that was finally accomplished in 1905 by the consolidation of the work in the Department of Agriculture. In the meantime the division of forestry had been changed to the Bureau of Forestry, so that there was in the Department of Agriculture a Bureau of Forestry with an appropriation of about \$350,000, and in the Land Office a division of forestry with an appropriation of \$375,000, each entirely independent of the other.

The consolidation, as I said, was made in 1905, February 1, 1905, now nearly three years ago. At that time the Forest Service had prepared itself, by a careful study of the national forests, for the work which it foresaw was going to drop upon it, and had a policy thoroughly worked out and was ready for the undertaking. When the transfer was made the organization of the Forest Service was such that fourteen men reported to the Chief, which was a bad form of organization. That was rapidly reduced to nine and finally, last year, in April, we succeeded in reaching the present form of organization, which, being of a modest disposition, I think is the best form there is under the Government anywhere. That is, I do not believe that any other Government body has as logically and satisfactorily arranged a chart as ours. The essential features of the chart are that there are five specific divisions of the work—the office of the Forester, which has the general supervision and inspection of the work; the branch of operation, which does all the business of the Forest Service; the branch of grazing, which handles all grazing questions; the branch of silviculture, which has in charge the growing of forests; the branch of products, which deals with the use of what is produced. So we have got the supervision, the business management, the growth of timber, and the use of what is grown divided up along those lines. I do not know whether there has been any explanation to you gentlemen of the uses of a chart, or what is the object of making one.

Mr. COCKS. I think not. I do not remember any.

Mr. PINCHOT. If I may, I would like to say a word about that. Our chart was the first one, so far as I know, ever made for a Government body. The reason it was made was that we began to feel in the Forest Service, without definitely knowing just why, that the organization was not sufficiently effective. A statement of this kind immediately shows whether there is any hole in the method of organizing the work, as, for instance, if responsibility is not clearly defined or rests on the wrong person, or if parts of the work which should go together are separated and likely to work at cross purposes. When the chart was first made it showed at once that there were fourteen men reporting to the chief. No one man can successfully keep track, in an organization like the Bureau, of the work of fourteen other men. It is too many. We found by investigation that the great commercial organizations limited the number of men reporting to the chief to from three to five, which is a much more handleable method. You see, the business of the chief of a bureau ought not to be solely to conduct the routine work and sign letters, but if he is of any value to the bureau he ought to spend a very large

part of his time in devising methods of work, inspecting the work, and using his head, and therefore he can not have too many people running to him with details all the time. So when our lines of responsibility were drawn and we found we had too many, we worked until we got the number down to nine, and then worked further and got it down to the present scheme, which gives four men in charge of the detail work of the Forest Service. The Forester has time now to keep track of what is going on, to keep a careful supervision of the inspection work, and the chance now exists, as I think, for the Chief of the Bureau to fulfill the functions which a chief of bureau ought to fulfill.

Now, a word about the individual branches. With your permission, I will take the branch of operation first. You will see under the branch of operation, the offices of maintenance, accounts, organization, engineering, and lands, five men reporting to the chief of operation. Let us take the office of maintenance first. Under that are purchase, supplies, photography, and record. Purchase means all the supplies which are bought for the Forest Service. The amount is now getting to be very large, necessarily, on account of the large number of men we have. Supplies are purchased by one man and are distributed at present from Washington all over the field. We find that that method is not sufficiently economical or sufficiently prompt, and we are accordingly planning to establish a depot of supplies for the bureau in Ogden, where we shall be within a day or two of all of the national forests. After we have got that depot organized, if it works well, we plan to establish in other parts of the West other depots, so as to cut out delay. One of the most essential things in managing this entire business is to be able to cut through red tape and get what you want quickly. The Forest Service is trying to get everything it can out of Washington and into the field.

Purchase buys these things; supplies fills requisitions, of which there are very large numbers, and ships them by freight from here, or has them shipped by the men who supply them, to all the national forests. Photography does two things. It prepares and develops maps, and keeps a record by means of photographs of the condition of various work and various lands in the United States. Our collection of photographs numbers now about 30,000 prints of views distributed very carefully all over the United States. I have here among these charts which I hope to show you a little later one which describes exactly what has been done in this line. Record is keeping tab of all the work of the Forest Service which requires to be recorded, except accounts.

Of the office of accounts I want to speak a little more at length. We have been endeavoring to establish a thoroughly businesslike system of accounts in the Forest Service, and I have before me at the end of every month a statement. The statement for the month ending December 31 is here, which shows me for each unit on this chart, and for the Service as a whole, the allotment for its work, the disbursements and liabilities against this allotment, and the balance remaining.

The CHAIRMAN. Do you know the allotment at the beginning of the fiscal year?

Mr. PINCHOT. I know the allotment at the beginning of the fiscal year, and I keep at the beginning a considerable contingent in the

office of the Forester, and as new lines of work appear during the year I distribute that allotment. For instance, such a redistribution takes place at or about the 1st of January and has just been made, and accordingly this statement does not correctly represent the allotments now in effect.

Mr. HAWLEY. About these depots. You have a great many men working in and around Oregon.

Mr. PINCHOT. Yes.

Mr. HAWLEY. Would it not be cheaper to establish one, say, at Eugene, Oreg., a central location there to all these reserves? Could not you buy your supplies cheaper there than at Ogden and save all the freight and expense?

Mr. PINCHOT. I expect to have a depot before long at Portland, but, as in the rest of this work, we are obliged to go somewhat slowly until we find the right man, and a trained man, to put in charge. I have only one man I am able to trust away from Washington in charge of a depot, but I have another man training, and as soon as I get that man ready I expect to establish a depot at Portland.

Mr. HAWLEY. The prices of materials on the coast are cheaper than in the interior.

Mr. PINCHOT. With a depot like that we buy in very large amounts from the original manufacturers. For instance, we get our barbed wire in carload lots.

Mr. COCKS. We do not understand that because the depot is located in Ogden you purchase your supplies there?

Mr. PINCHOT. No, sir; all over the United States.

Mr. COCKS. That is nothing but a storehouse there?

Mr. PINCHOT. Yes, sir.

Mr. COCKS. I would like to know whether you pay just like other Departments and whether you give subtreasury checks, or how?

Mr. PINCHOT. No, sir; there is a disbursing officer of the Forest Service, and he is authorized by the Secretary of Agriculture from time to time to have certain amounts put to his credit in the subtreasury, and he checks against that.

Mr. COCKS. Does each individual receive a Treasury check signed by him?

Mr. PINCHOT. Yes, sir.

Mr. HAWLEY. What I had in mind a moment ago in reference to Mr. Cock's remark was, if you buy from an eastern manufacturer and ship to Ogden, for instance, you pay the short-haul price on freight, and then from Ogden to Portland you probably pay the terminal rate; and if you shipped directly to the coast you would save one rate.

Mr. PINCHOT. Yes; it is a great deal better to have one central depot there.

Mr. HAWLEY. And you could ship by water a good deal of your supplies, especially when the Panama Canal is put through.

Mr. PINCHOT. You can not work any faster than you can get the right men, and we can not afford to take any chances whatever in the matter of supplies of having any slip up at all, and therefore I thought it was better to go slow, establish one depot with a man I am sure of, and then establish another on the coast.

Mr. HAWLEY. What do these supplies consist of?

Mr. PINCHOT. Wire, staples, axes, shovels, spades, saddles, bridles, in some cases stoves (we have to equip some of the rangers' cabins back in the country with stoves), file cases and other office furniture, blank forms, and so on, all the material which is needed to run an office, and material which the rangers themselves need in their work in the forest.

Mr. COCKS. Do the horses they use belong to the Department or belong to them?

Mr. PINCHOT. No, sir; they belong to them. We have considered it at considerable length, and it is a great deal cheaper to have the men own their own horses.

Mr. HAWLEY. The horses get better care, as a rule?

Mr. PINCHOT. A lot better care, and if a ranger kills a horse through falling over a cliff it does not take six months to get that horse officially killed.

Mr. COOK. Are the horses maintained by the forester or by the Government?

Mr. PINCHOT. No, sir; by the man who owns them. We have no responsibility for his live stock at all.

Mr. LAMB. They furnish their own horses and only get \$900 a year?

Mr. PINCHOT. Yes; the salaries of the rangers are too low for the work they do and the responsibility they have.

Mr. HAWLEY. The maintenance of the horses in the summer in the field is very little. They can live on the forage, can they not?

Mr. PINCHOT. In most places. We are considering seriously making a horse allowance to the rangers, and I think it will come to that in the end, not for the horses but for the feed, for the reason that one \$900 man will have to haul grain for his stock, whereas the next man right over the ridge may have plenty of pasture, and it makes the net proceeds to the ranger very uneven. I think we will probably get better work out of them if we give a graduated allowance to them, in proportion to what it costs them to maintain their stock. The work is very hard; their horses last but a short time under it, as a rule.

I was saying that there is here presented at the end of every month a statement which shows the exact financial condition of the Forest Service; our accounts are kept in such shape that that can be ascertained by any one of these branches at any time during the month, so that we always know not only what we have spent, but what we have engaged to spend, which is an important thing; so that when a man is hired, say, in January, his pay for the rest of the year goes at once into the liabilities of this statement and we know that we are not only able to pay for what we have done, but that the work which has been projected to the end of the year is all covered by the appropriations. In this way we do not have any such thing as a shortage, and can not have it. These statements have been running in practically the same form for a number of years, and the statement has worked out thoroughly well. I might add that we are attempting to keep our accounts as much up-to-date as a bank, for instance, and we know at the end of every day just what the receipts, for example, from the national forests are to the close of business of that day. I have here the statement up to the close of business yesterday. I have here also

the daily disbursing balance sheet, and, with your permission, I should like to have it made a part of the record.

FOREST SERVICE.

Daily disbursing balance sheet, January 22, 1908.

| | |
|----------------------------------|---------------|
| Balance last report..... | \$61, 638. 35 |
| Deposited since last report..... | |
| Disbursed since last report..... | 15, 058. 88 |

| | |
|--------------|-------------|
| Balance..... | 46, 579. 47 |
|--------------|-------------|

Appropriations, as follows:

| | |
|---|-------------|
| General expenses, 1907..... | 2, 547. 93 |
| Salaries, 1908..... | 6, 230. 02 |
| Administration, etc., F. R..... | |
| Cooperative work, F. I..... | 883. 75 |
| Wichita F. & G. P..... | 2, 485. 60 |
| Administration, etc., National Forests, 1908..... | 6, 541. 49 |
| Survey, etc., App. & White Mts., 1907-8..... | 1, 816. 06 |
| Ref. to Dep., etc..... | 1, 609. 14 |
| General expenses, 1908..... | 24, 465. 48 |

| | |
|------------|-------------|
| Total..... | 46, 579. 47 |
|------------|-------------|

Balance, Washington:

| | |
|---------------------|------------|
| G. E., 1907..... | \$0. 25 |
| A. N. F., 1908..... | 141. 66 |
| Sal., 1908..... | 476. 42 |
| G. E., 1908..... | 1, 428. 35 |
| | 2, 046. 68 |

Balance, New York:

| | |
|---------------------------|-------------|
| G. E., 1907..... | 2, 547. 68 |
| A. F. R..... | |
| C. W. F. I..... | 883. 75 |
| W. F. & G. P..... | 2, 485. 60 |
| G. E., 1908..... | 10, 255. 34 |
| A. N. F., 1908..... | 6, 399. 83 |
| Survey, etc., 1907-8..... | 1, 816. 06 |
| Ref. to Dep., etc..... | 1, 609. 14 |
| | 25, 997. 40 |

Office pay rolls:

| | |
|------------------|-------------|
| Sal., 1908..... | 5, 753. 60 |
| G. E., 1908..... | 12, 781. 79 |
| | 18, 535. 39 |

Cash.....

| | |
|------------|-------------|
| Total..... | 46, 579. 47 |
|------------|-------------|

I have now spoken of maintenance and accounts. I will skip organization for a moment and pass to engineering and lands. The national forests when we took charge of them had almost nothing done to them. I have a very careful statement here showing exactly what roads and trails and bridges were built by the Government in all the national forests from the beginning up to the 30th of June, and it is almost insignificant. In other words, this enormous property was almost without improvements of any kind. Much of it was inaccessible. A great deal of it returned no revenue because of the fact that it was inaccessible, and danger from fire was much increased because of the fact that people could not get around. The first thing we did was to take the thing up as any owner would, by improving his property. It was necessary to have a great deal of the work supervised by a competent engineer, and the office of engineer-

ing was created for that purpose. An appropriation of \$500,000 was made last year for this permanent improvement work, and I shall, with the chairman's permission, submit a further estimate for improvement work before I am through. Under the work authorized last year we have built, or are building, between 3,000 and 4,000 miles of telephone lines, nearly 3,000 miles of trails and some hundred miles of roads, nearly 100 barns, 600 cabins, several hundred miles of fence, and so on.

The CHAIRMAN. To what extent have you been cooperating in the building of these telephone lines and trails and roads with local interests or persons?

Mr. PINCHOT. We have been cooperating constantly.

The CHAIRMAN. Can you give us an idea of the amount the cooperators have contributed to the work?

Mr. PINCHOT. In a broad way, a quarter of the work was paid for by cooperators. We are cooperating with States in building wagon roads and bridges, with associations of settlers for roads and trails, with associations of stock owners for drift fences, and so on. In many cases where drift fences are necessary for the handling of the stock on the range, we say to the stock owners "We will give you the wire and staples, and give you a right to cut posts, and you build the fence."

The CHAIRMAN. You have spoken of the drift fences. Let me inquire whether the question of building a drift fence across the reserve in Arizona which is occupied in part by Mr. Jones with his sheep and buffalo breeding experiments has been brought to your attention?

Mr. PINCHOT. Yes, sir.

The CHAIRMAN. And what do you think of the propriety of it and the likelihood of your Bureau building such a fence?

Mr. PINCHOT. I have not got far enough in the investigation to have a very clear-cut notion. As far as I have got, I am very doubtful about it.

The CHAIRMAN. As far as the authority of your Department is concerned, you have authority, if you had the funds, to build that fence?

Mr. PINCHOT. I am not clear, gentlemen. I have a report from one of the inspectors on that subject which I have not had time to go into, and Mr. Jones has promised me a statement himself on that subject which I have not yet received.

The CHAIRMAN. What is the name of that reserve?

Mr. PINCHOT. The Grand Canyon North. Another important piece of work which the office of engineering has had is to oversee and check up various commercial enterprises which are being established in the national forests, and perhaps this is as good a place as any to speak of the question of water power and the contest which is now going on between the large water-power companies and the Forest Service. There is being built up in the West the largest and most penetrating monopoly that has ever existed either in this or any other country, to my knowledge. The control of water power is gradually passing into the hands of a few great companies throughout the western region.

Mr. HAWLEY. What do you include in the term "West?"

Mr. PINCHOT. I should say the whole Rocky Mountain and coast region. Where there is not any coal or oil, or as fast as coal or oil is exhausted, as far as we know, the main source of power is going to be water, and we shall find ultimately that the people who control the water power will control practically all the industries of the region where that power exists. In other words, they will control transportation for freight and passengers, all kinds of manufacturing, pumping for irrigation and municipal use, heating, lighting, all kinds of small domestic industries like running washing machines, churns, and sewing machines, and all the rest of it, so that literally a man who lives in a region where a monopoly of that kind has been created passes his whole life every day under the direct influence of it. He will turn on an electric light when he gets up, his breakfast will be cooked by electricity, his paper will be printed by electricity, and he will go to the office in an electric car, and so on and so on all day long, and he will be in constant touch with this great monopoly. That monopoly has already gone a long way toward actual existence in many of the Western States; I suppose farther in California, Mr. Hawley, than anywhere else. But the great companies which have this power are rapidly consolidating, and we are face to face with the actual existence of this thing. That was going on without let or hindrance until not long ago the forest service undertook to issue regulations, to make stipulations, in accordance with which it would allow the construction of water-power plants in the national forests, and undertook to collect a charge for it.

We have been in very active negotiation with a number of large water-power companies for more than a year past, they protesting that it was illegal for us to make any charge, and we saying that the opinion of the Attorney-General to the effect that it was legal was good enough for us, and we require definite stipulations as to their obeying the laws and locating their rights of way in a proper manner, and especially requiring that they should begin and complete construction within a reasonable time specified in the permit, operate for a specified period in each year, pay a small acreage and mileage charge from the date of the permit and a kilowatt-hour charge from the beginning of operation.

The CHAIRMAN. Have you attempted to levy a charge in any instance where the plant was already in operation?

Mr. PINCHOT. Yes.

The CHAIRMAN. That had been established before you took charge of the Forest Service?

Mr. PINCHOT. Yes.

The CHAIRMAN. And have you succeeded in that?

Mr. PINCHOT. Yes. The theory upon which the charge was made is this, that any commercial enterprise ought to pay for what it gets, ought to pay a reasonable sum for what is given to it by the Government, and that anybody who takes any product or makes any use of a national forest because of which some other man can not get that product or make that use ought to pay for it. On the other hand, if he makes such a use that he does not prevent anybody else from getting it, he ought not to pay for it. These people take something which, because they have it, nobody else can have, and therefore they ought to pay, and they are paying. The permits under which they have been operating according to law could only

be given as revocable within the discretion of the Secretary of Agriculture, and they think and we think that a definite term of years ought to be granted, and I shall make a suggestion to you later on as to a form of words to be put into the appropriation bill to that effect.

Mr. COOK. You refer to these large power plants being constructed in the West for the development of power and electricity for lighting purposes.

Mr. PINCHOT. Yes.

Mr. COOK. I will ask you if it is not a fact that the construction of these power plants will greatly reduce the consumption of timber from the forests?

Mr. PINCHOT. I think not.

Mr. COOK. Will you kindly give some reason for saying that, Mr. Pinchot?

Mr. PINCHOT. Because the purposes for which the electricity is used, except in rare instances connected with mining far back from the railroads, are not such as would be supplied by power from burning wood.

Mr. COOK. I would like to say, Mr. Chairman and gentlemen of the committee, so far as my State, Colorado, is concerned, we are building some very extensive power plants for the development of power and electricity for lighting. I will say to the committee that I personally know that contracts have been made with those concerns for furnishing power and electricity at 50 per cent less price than they are now paying in Colorado.

Mr. PINCHOT. Fifty per cent less than they are now paying for other fuel?

Mr. COOK. They contract for furnishing power and lighting at 50 per cent less than they are now paying.

Mr. PINCHOT. Yes; it is a very admirable thing that they should do that.

Mr. COOK. The people who have constructed the plant just above Leadville Springs have contracted to furnish power for mining at Leadville, in which I have been engaged for many years, for 50 per cent less than we have been paying. Therefore I can not agree with you as to these so-called monopolies you refer to. I have no interest in these concerns to which you refer.

Mr. PINCHOT. I understand.

Mr. COOK. You speak about the fact that they should pay for this water. I will ask you, if that is your view, why the steamboat men should not pay for the use of the waters in our rivers?

Mr. PINCHOT. For the reason that the fact that one steamboat runs does not prevent any other steamboat from running, whereas the fact that one company has taken up and used the water power does prevent anybody else from using it. We do not make any charge for the water. What we charge them for is the use of the national forest land in conjunction with protection we give them. We protect their watersheds and protect their water supply, which they would have to do if we did not. There is no charge for water. The water is appropriated in the manner prescribed by the State laws.

The CHAIRMAN. How do you arrive at a basis for your charge?

Mr. PINCHOT. We have been discussing that for the past year, and have been in consultation with the promoters of water-power works

and the men who are using them, and in addition to a small acreage and mileage charge we finally determined on a charge to be read off their meters in kilowatt hours.

Mr. HAWLEY. Can you make a charge where men have located water rights and have appropriated the water under some other law?

Mr. PINCHOT. We can make no charge except where they have to get something from the Forest Service that they have not got.

Mr. HAWLEY. Is there any considerable portion of the water in the forest reserves appropriated, or is there still water in the forest reserves unappropriated?

Mr. PINCHOT. I would say that a considerable portion is appropriated, perhaps 25 to 50 per cent of the best water powers are already gone. Some of them were held by water locations under State laws, but remained substantially undeveloped. Such speculative holding of undeveloped resources is now prevented by the regulations of the Department. Where a plant does not use national forest land we can make no charge. We think, however, that, like any other public-service corporation, these great plants ought to bear their proportion of the expense of maintaining the national forests, which are valuable to them.

The CHAIRMAN. Will this policy on the part of the Forest Service go to eliminate the monopoly feature of the situation you spoke of?

Mr. PINCHOT. Yes. It prevents the speculative holding of undeveloped power sites, and it will give the Government a chance to regulate these great corporations. In other words, instead of their having permanent easements, which they are trying to get, they will have permits terminable at a certain time, and the Government will have the right as the people have in the case, for instance, of street-car companies, at the end of a given period to revise the conditions under which that use can be continued, and the rate of charge made for it. It leaves an opening for such future regulation as may be necessary.

Mr. McLAUGHLIN. How is that to be done? You can not stop the water. You may refrain from giving it protection, and the lack of protection may cause it to dry up, but otherwise how can you control it?

Mr. PINCHOT. We can only do it where the plant uses national forest land.

Mr. McLAUGHLIN. They have some artificial means of transmitting the water?

Mr. PINCHOT. They will take the water out of the stream at a certain point and run it along a hillside and drop it through a penstock.

Mr. McLAUGHLIN. Without having the permission of the Government originally to do that?

Mr. PINCHOT. They first file a notice of water appropriation in the form prescribed by the State laws. To cross private land or Government land with flume or pipe line; they must also get the permission of the land owner. This hitherto they have got from the Government as a revocable permit. Now, they do not want a revocable permit. They say they want permanence in their operations. We want to give it, but can not now do so under the law. We are not opposed to the development of these water powers. On the contrary, we are very anxious for it; only we want them developed in such a

way that the Government will have some chance to intervene and regulate this great monopoly, as it is regulating railroad monopolies, and so on.

The CHAIRMAN. About all you can do is to tax it, is it not?

Mr. PINCHOT. No; we can make certain regulations that will prevent it from doing certain things, such as monopolizing undeveloped resources, and, what is more important than all, we can set a definite date in advance at which the conditions under which that monopoly is exercised are subject to review.

The CHAIRMAN. Yes; but recalling the thought that was in Mr. McLaughlin's mind, suppose the conditions that you impose at the end of a given period are not accepted by a given company which has been using the power, what are you going to do about it? Can you shut off the water?

Mr. PINCHOT. No.

The CHAIRMAN. Or can you compel the company to remove its plant?

Mr. PINCHOT. Yes; remove its plant, or its transmission lines.

The CHAIRMAN. If it is on the reserve?

Mr. PINCHOT. Yes.

The CHAIRMAN. But suppose it is outside of the reserve?

Mr. PINCHOT. The Forest Service can do nothing about it; can not require the company to take a permit now, or in the future if it is outside; but the majority of the plants will be inside, because the mountains are included in the boundaries of the reserves.

The CHAIRMAN. In that case all you can do is to increase the tax?

Mr. PINCHOT. Increase the tax or make different conditions.

Mr. GILHAMS. Then the fact is that the great water powers of the Rocky Mountains and of the Pacific coast are almost all in the forest reserves?

Mr. PINCHOT. Yes.

Mr. LEVER. And belong to the Government?

Mr. PINCHOT. No; the Government has control of the land and a pipe or transmission line can not pass across Government land without the Government's permission.

Mr. LEVER. The water belongs to the State?

Mr. PINCHOT. The water is appropriated under the laws of the State.

Mr. HAWLEY. Are you furnishing now any water through flumes, through ditches, to plants not in the forest reserves?

Mr. PINCHOT. Yes; a great deal.

Mr. HAWLEY. And in case one of those plants did not comply with the regulations, you could shut the water off?

Mr. PINCHOT. Not unless the flume goes over Government land. If it goes over Government land, we can, but not otherwise.

Mr. COOK. I might say for your information that the Supreme Court in the Colorado-Kansas case decided that we had a right to use the water in our own State. I would like to ask Mr. Pinchot this question: Take the Grand River, where this large power plant is being established, above Leadville; is it not a fact that for all time that water is perfectly useless and flows out to the Gulf of California?

Mr. PINCHOT. Unless it is used. It has got to be used to be of use; certainly.

Mr. COOK. It is not a navigable stream at the place where this plant is being established which Mr. Pinchot speaks of as a monopoly. We do not so consider it in Colorado. We think it is a great benefit to all of our people engaged in manufacturing and mining as well as to the man that uses electric light for lighting his house.

Mr. PINCHOT. Please do not understand me as saying that it is not a benefit. I think it is a tremendous benefit, but I think that, like any other public service, it should be under regulation.

Mr. WEEKS. I do not suppose that Mr. Pinchot would contend that all monopolies are antagonistic to the interests of the people.

Mr. PINCHOT. Not by any means.

The CHAIRMAN. As I understand his position, as Chief of this Bureau he justifies his charge in a case of that kind on the theory that his bureau is protecting the watershed, and thereby guarding the regular, continued flow of this river, which otherwise might be interfered with.

Mr. PINCHOT. That is it. And we are also giving to individuals and corporations permits for the exclusive use of exceedingly valuable power sites, thus shutting out every other individual or corporation from the use of them.

Mr. HAWLEY. And the charge you make is not for purposes of revenue, but for purposes of regulation?

Mr. PINCHOT. Precisely.

The CHAIRMAN. You spoke a while ago of the contest going on between your Bureau and the users of the power. Has that ever gotten into the courts?

Mr. PINCHOT. No; it has never gotten into the courts.

Mr. LEVER. Mr. Cook spoke of this Colorado-Kansas case.

Mr. COOK. That was decided a short time ago by the Supreme Court of the United States in favor of Colorado. In other words, with all due respect to our chairman, the State of Kansas tried to prohibit the State of Colorado from taking water from the Colorado River just above Leadville. It has been fought through every court up to the Supreme Court of the United States, and I am very glad to say we have got the better of our friends through the Constitutional power of the United States.

Mr. HAWLEY. The water, you say, belongs to the State?

Mr. PINCHOT. It is appropriated as the State laws prescribe.

Mr. HAWLEY. Can that water in the national forests be appropriated under State law by individuals?

Mr. PINCHOT. It is so appropriated.

Mr. HAWLEY. So that the time is coming when it will all be under individual appropriations, in all probability?

Mr. PINCHOT. Yes; all of it.

Mr. HAWLEY. And they can sell it out to these large bodies and corporations?

Mr. PINCHOT. Yes.

Mr. HAWLEY. Then what are you going to do; regulate it?

Mr. PINCHOT. We can regulate the corporations.

Mr. HAWLEY. Have you the authority under the law to do that?

Mr. PINCHOT. We have this right to make a charge and prescribe conditions without which we will not let them cross Government land. That is the power we have.

Mr. HAWLEY. There is another question that has arisen out there that I do not know the answer to. Where a man owns a water

right on his own land and has a mill on his own land, but in order to discharge his water he has to run it on Government land, can he do that? There have been cases where mining properties have been abandoned, as I have been told, by a man who was in that position. Have you ever had that called to your attention?

Mr. PINCHOT. I never met that condition.

Mr. HAWLEY. They would not allow him to discharge his water on the Government land, because they said it would wash it. Of course it would, in a measure. That was in eastern Oregon.

Mr. McLAUGHLIN. Where water flows a regular course, and is dammed and used by a company, you do not claim any right in the Government to regulate or make any charge in any way whatever against him?

Mr. PINCHOT. If he is outside the forest, no; unless he has to use Government land to do it.

Mr. McLAUGHLIN. On that assumption of a case where the water was permitted to run its regular course.

Mr. PINCHOT. Suppose the stream is running through the mountains, and it runs through a narrow outlet, a canyon, and he wants to dam that and run the water up over Government land.

Mr. McLAUGHLIN. Then he has to have a flowage right?

Mr. PINCHOT. Yes, he has to have a flowage right.

Mr. McLAUGHLIN. I can understand how if he has to run his line over Government land, if he has to take his water over Government land, he has to have a right of flowage.

Mr. PINCHOT. If he does not run it over Government land, we do not have any right to make a regulation.

Mr. McLAUGHLIN. But simply because the Government is protecting the forests, and thereby protecting the sources of the supply of this river, you would not claim a right to make any charge against the owner of that water?

Mr. PINCHOT. If he does not require to use Government land, we can not.

I have said just a word about what the office of engineering is doing. As to lands, in the office of lands you will see "boundaries, settlement, claims, status, special uses." "Boundaries" means the organization by which we make very thorough and careful examinations and maps of proposed new national forests. The procedure is this: Some one will recommend that a particular area be included in a national forest. Before anything definite is done that area is withdrawn temporarily. Then a very careful map and examination on the ground is made into this proposition, showing what proportion of it is alienated under public land laws; how much is agricultural or grazing land; and how much of it is burned, and so on. So that before we come to a conclusion whether any piece of land ought to be put into a forest by Presidential proclamation, we have very exact knowledge of its present condition.

The CHAIRMAN. Was there not an act passed in the last Congress providing that there should be no further forests made by proclamation?

Mr. PINCHOT. In six Northwestern States.

Mr. COOK. Will you please name those States?

Mr. PINCHOT. Washington, Oregon, Idaho, Colorado, Wyoming, and Montana—those six. The section of "settlement" is occupied with the work arising under the act of June 11, 1906, under which any land chiefly valuable for agriculture which may be included in a national forest is open to entry under the homestead act. When you draw a boundary around a great area of country, you can not exclude all agricultural land, because there will be 160 acres back in a little valley here, and a little more here and here, and you may cut out what is around the edges, but not the interior pieces, and it was very undesirable that any of that land suitable for homesteads should be withdrawn from homestead use. Therefore the Forest Service submitted and Congress passed a law providing that anybody who wants a piece of land in a national forest may make application for an examination of it and its listing by the Secretary of the Interior. The procedure is this: If I am an intending settler, I go and look at the land I want to get, and I make an application to the Forest Service for the listing of that land. That application is dated upon its receipt so that if any other man comes along and makes a previous or subsequent application it can be decided which has the right, because the first applicant has the right. Then the forest officer goes on that land and inspects it, with his knowledge of western conditions, and makes a careful map and report of it. He reports in what condition the land is, if the settler has been there a long time, what his improvements are, what the condition of the timber is, and so on, and so on. That report is then referred back here to Washington, and if the land should be listed it is transmitted by the Forest Service to the Land Office. The Land Office makes the final decision in the case of disputed priority or anything involving the title to the land.

Mr. HAWLEY. What is the date of that law?

Mr. PINCHOT. June 11, 1906. We have had so far nearly 6,000 applications under this act, and we have made about three-quarters of the examinations and reached a determination upon them.

Mr. McLAUGHLIN. You speak of ascertaining how long the land has been occupied?

Mr. PINCHOT. Yes.

Mr. McLAUGHLIN. That means that some of those people have just gone in and squatted without any right whatever?

Mr. PINCHOT. No; that means that before the creation of the national forests in many cases settlement was made or attempted to be made or claimed to have been made.

The CHAIRMAN. Under the homestead act?

Mr. PINCHOT. Under the homestead act, in the national forests.

Mr. McLAUGHLIN. This act could not affect their right, could it?

Mr. PINCHOT. No; not in the slightest degree.

Mr. McLAUGHLIN. Then this proceeding you go through is just simply to prove their right? You have not the authority, nor has the Land Office authority, to do anything but grant their request, if they make the proper proof?

Mr. PINCHOT. There are two settled things. One is the national homestead law, under which a man may have made settlement before the forest was created. Under that condition it is simply a question with the Land Office whether he has complied with the law. But if he has not made settlement, or has made settlement in an incom-

plete way so as not to have a legally perfect claim, we do our best for him. A great many people have done that; they have gone in and settled and have not fully complied with the law, so that under the regular homestead law they could not get title, but they have lived on the land more or less and have improvements, and so on, and where a man has given evidence of good faith in that way, we do our best to see that he gets his home.

Mr. McLAUGHLIN. In the case of new applications, you are not disposed to permit of the taking out of any timber lands?

Mr. PINCHOT. No; that is the particular crux of a war that is made against us in a good many places. We find that about half of the applications made under the act of June 11 are actually for the timber.

Mr. HAWLEY. What amount of timber may there be on 160 acres, or what is the maximum of the agricultural area?

Mr. PINCHOT. We can not make a definite determination of that, because we consider also the case of whether the land is good agricultural land or not. The language of the law is that it must be more valuable for agriculture than for forest use, and that varies, of course, with the quality of the land.

Mr. McLAUGHLIN. Does that include a settler who might take some good agricultural land without any timber whatever?

Mr. PINCHOT. No; simply his claim must be of more use for agriculture than for the timber. We do not want a man, as has happened in so many cases in the West, to take up his land and hold it long enough to get the timber cut off and then go away and leave it.

The CHAIRMAN. Does the final determination rest with you or with the Interior Department?

Mr. PINCHOT. So far as title is concerned, with the Interior Department. We have no right to make a determination of any kind which gives title. The Secretary of Agriculture, however, decides the fact as to whether the land is agricultural, and should therefore be listed.

The CHAIRMAN. You simply ascertain the facts and put them before them?

Mr. PINCHOT. Yes; in the form of a request to list.

Mr. HAWLEY. Have you sufficient force to look up these claims as fast as they are made?

Mr. PINCHOT. We have now. They were made in such very large numbers that they snowed us under for a time. Before June 30 we made something like 800 examinations. Since June 30 we have made about 3,900 examinations, and our present force is now just about keeping level.

Mr. LEVER. In setting out a new national forest, I presume you sometimes learn that the individual owns his land within that area?

Mr. PINCHOT. Yes.

Mr. LEVER. What do you do with him?

Mr. PINCHOT. He owns it just the same.

Mr. LEVER. He owns it just the same?

Mr. PINCHOT. We have no effect upon him whatever. Any bona fide claim upon any national forest is just as good inside as one outside.

Mr. LEVER. Was there never a time when the Government would buy that land from him and allow him to exchange that land for other land?

Mr. PINCHOT. Yes.

Mr. LEVER. What was that regulation?

Mr. PINCHOT. There was a lieu land law, which has now been repealed, under which he could convey back his title to the Government and take other lands in lieu of it elsewhere. When that law was passed it was intended to apply to the actual settler, but either in the course of its passage through Congress or in the course of its interpretation by the Interior Department it got to a place where it applied to the railroads, and the railroads abandoned enormous areas of land above the forest line, much of it utterly worthless, and took extremely valuable timber lands elsewhere.

Mr. LEVER. Is there any record anywhere showing the amount of those exchanges?

Mr. PINCHOT. Yes; the Land Office has that.

Mr. LEVER. The Land Office has that?

Mr. PINCHOT. Yes. We never had anything to do with that.

Mr. LEVER. That law has been repealed?

Mr. PINCHOT. That law has been repealed. It was repealed three years ago?

Mr. LEVER. The Government in a measure under that law, however, did actually buy from these landowners their land?

Mr. PINCHOT. The Government bought it with other land.

Mr. LEVER. With other land?

Mr. PINCHOT. Yes.

Mr. LEVER. It was a purchase, though?

Mr. PINCHOT. Yes; substantially it was a purchase; but in actual operation what happened was that the man returned his land to the Government and received a paper which gave him the right to locate on land elsewhere, and then he sold that paper.

Mr. HAWLEY. That was called land scrip?

Mr. PINCHOT. Forest-reserve scrip or land scrip; and that was a very important article of commerce in the West, and in the East as well, and many of the most important land frauds, such as those under which Benson and Hyde were indicted, rested on that thing.

Mr. LEVER. This scrip circulated as currency?

Mr. PINCHOT. In the same way as a railroad bond. It was bought and sold.

Mr. HAWLEY. The Northern Pacific had a lot of land in the Bad Lands of Dakota, and this summer they filed on 10,000 acres of as fine timber land as I ever saw. The passage of that act was a great mistake.

Mr. PINCHOT. It was. The Forest Service was intimately connected with getting that law repealed.

Mr. HAWLEY. Who recommended that law?

Mr. PINCHOT. That law was recommended by the Interior Department. I remember the circumstances very well, and the people who urged the law intended that it should apply to settlers, but in the shuffle it was made so that it applied to the railroads as well.

Mr. HAWLEY. The shuffle was in the final deal in that law when it passed, was it not?

Mr. PINCHOT. I have never been sure, and I am not sure now, that the Interior Department could not have interpreted that law, if it had chosen, in such a way as to have prevented the railroads from getting that right, although the wording of the law is that any bona fide settler or owner could make this exchange.

Mr. COCKS. They ought to have left out the word "owner?"

Mr. PINCHOT. They ought to have left out the word "owner."

Mr. BEALL. Was that put in in the final shuffle?

Mr. PINCHOT. Yes; that was put in in the final shuffle.

Mr. LEVER. Going back to the question of the bona-fide settler within the national forest, does your Bureau ever cooperate with that individual in protecting his lands against fires, or anything of that kind?

Mr. PINCHOT. Constantly; and the best friends we have in the West are the actual settlers who live in or near the national forests.

Mr. HAWLEY. The settlement of agricultural areas within the forests is going to decrease your expense greatly?

Mr. PINCHOT. There is nothing that will help us so much.

Mr. HAWLEY. I have been over that forest hunting, and I find settlers generally are much interested in the work of preventing fires in the forest.

Mr. PINCHOT. Where is that forest?

Mr. HAWLEY. In the Cascade Mountains.

Mr. PINCHOT. Good. I think it is safe to say that we have no such uniform set of friends anywhere as the men who are living inside the boundaries of the forests.

Mr. LEVER. I have heard the charge made that on account of the establishment of these national forests you were preventing settlement of these lands, and that you were practically taking away from the bona fide settler all the advantages of roads and schools, and things of that kind, because you were keeping back the settlers. What have you to say about that?

Mr. PINCHOT. I have heard that before, a good many times. We are not keeping back bona fide settlers. The man who actually wants to make his home in the country has every facility offered to him under this law. We are building roads and trails that he could not build himself, and we are building bridges and protecting his land from fire, and we are helping him to get neighbors in there just as far as the land will permit people to live on it, and we are doing everything we know how. Instead of retarding the growth of the country we are trying to push it ahead; and I think you will find that they think that way, do they not, Mr. Hawley?

Mr. HAWLEY. There is only one question there now, the question of roads over forest reserves. The counties have to maintain them, and sometimes they have to run a road 10 or 15 miles over a piece of forest reserve, and they get no help from the Government in keeping that up; and being through a forest it is a very hard place to build a road, because it remains wet so much of the year.

Mr. PINCHOT. We have been spending quite a good deal of money on that same question of roads, just as fast as we can get it, and the appropriation which was made last year provides for the construction of 151 miles of roads. That is not very much road compared with the total area, but also the money that we had was not very much.

The CHAIRMAN. Have you at hand, or can you prepare, a statement that would show the development of the regions in which your forests are located since you have had control of them, as compared with preceding and equal periods of years?

Mr. PINCHOT. We can show what we have done, but I do not think there are any records anywhere that would show the conditions before.

The CHAIRMAN. I had it in my mind to bring out, as Mr. Lever had suggested, in as graphic a way as possible, the answer to the criticism that is made of the Forest Service that it would retard the development of the country.

Mr. LEVER. Would you be willing to say in a general way that in these reserves the population has increased and the conveniences of country life have been added to, as over and against areas outside of the reserve?

Mr. PINCHOT. I will say that very definitely, that mountain regions inside have increased in population and conveniences as compared with mountain regions outside.

Mr. POLLARD. I have just come in, Mr. Pinchot, and perhaps this matter has been covered in the committee while I was out, but I would like to know whether in a forest reserve a home seeker can go in and take up Government land as a homestead—timber land?

Mr. PINCHOT. He can take a homestead.

Mr. POLLARD. And he can prove up on it just the same as he can on any other Government land?

Mr. PINCHOT. Yes; and we have certain favorable recommendations already in the case of 1,400 such claims, under the act of June 11.

Mr. POLLARD. Has there been anything done by the Department to discourage settlers, home seekers, coming in and taking homesteads?

Mr. PINCHOT. Before this law of June 11, 1906, was passed, a homesteader could not go in, and all we could do then, and we did a great deal of it, was to find where the agricultural areas were and exclude them.

Mr. POLLARD. From the forest reserve?

Mr. PINCHOT. Yes; but many of them were too small and too far in the interior to be excluded by Presidential proclamation. Then we got this act passed of June 11, by which anybody who can find a piece of agricultural land in a forest reserve can apply to take it up.

Mr. McLAUGHLIN. I suppose that the system of surveying out there is the ordinary system, by which the country is divided into towns and ranges and sections and quarter sections?

Mr. PINCHOT. Yes, sir.

Mr. McLAUGHLIN. And when an application is made for a particular piece of land it is not the purpose or the policy of your Department to permit a quarter section to be taken up that has a large amount of timber on it?

Mr. PINCHOT. No, sir.

Mr. McLAUGHLIN. What is your policy in that respect?

Mr. PINCHOT. We are directed to recommend for listing only land that is more valuable for agricultural purposes than for forests.

Mr. McLAUGHLIN. But every piece of agricultural land must have some timber on it.

Mr. PINCHOT. Much of it has. I could bring before you many actual cases, if you want them. For instance, in northern Idaho we have many cases of which this is typical. A man has gone into a deep, narrow canyon and located on 160 acres covered with magnificent timber, and there are a few acres in the bottom of that canyon capable of cultivation, and he has gone and spaded that up and made a garden and then gone and made application for settlement.

Of course he can not have it. When I was out in Idaho sometime ago, one morning two nicely dressed ladies came in to see me; one of them was a school-teacher and the other was a dressmaker. They had located on a homestead 200 miles back in the country. They had located three years before and had been in there twice for a few days at a time. It was in one of the heaviest timber belts of Idaho. They came to see me to see if there was not some way they could get their homestead. That was a typical case.

Mr. McLAUGHLIN. They did not get it?

Mr. PINCHOT. They certainly did not; they ought not to have it.

Mr. McLAUGHLIN. I believe that if Mr. Pinchot is proof against such blandishments the Forest Service is in good hands.

Mr. COOK. Do you allow the man who takes up this homestead to cut any timber?

Mr. PINCHOT. Yes.

Mr. McLAUGHLIN. Do you require him to pay under the stumpage act for what he cuts?

Mr. PINCHOT. No; he gets his homestead absolutely. He has one decided advantage over the man who wants to get a homestead outside of a forest, in that he can get title under this act to unsurveyed land, because the Secretary of Agriculture has the right to have it surveyed by metes and bounds, and it need not be tied up to a regular survey. We were anxious for that for this reason, that in a large number of national forests we found men who had lived on their homesteads for years, and had been unable to get patents to them because the public survey had not been extended over their areas. When the national forests were created these men had no title. They could not get title until the surveys were extended, and in many cases that would not be for many years; so that we made a provision in the law that any kind of a homestead might be surveyed by metes and bounds without tying it to a public survey, and a man could get title right away.

Mr. HAWLEY. What is the expense of that to the settler?

Mr. PINCHOT. There is an appropriation just asked for by the Secretary of the Interior for the cost of making such surveys.

Mr. HAWLEY. At present the survey is made at the expense of the settler?

Mr. PINCHOT. Yes; it ought not to be.

The CHAIRMAN. Suppose you answer Mr. Cook's question more fully as to the right of a homesteader to cut wood adjacent to a homestead; inside and outside of a forest reserve.

Mr. PINCHOT. They are exactly the same. It is simply an extension of the homestead law. Every right that a man has outside of a forest, under the homestead law, he has under the law of June 11, which simply extends the homestead law to him.

The CHAIRMAN. Is it not true that you also permit a homesteader either adjacent to a forest or in a forest to cut all the wood he needs for his uses?

Mr. PINCHOT. Yes; for use.

Mr. COOK. Do you not require under your rule that this man who has taken up this homestead must first get a permit from your forester?

Mr. PINCHOT. No, sir.

Mr. COOK. Then, I want to say that in our State your foresters have many times required that from the people.

Mr. PINCHOT. On a homestead?

Mr. COOK. Yes; they have required them first to get a permit before they cut a stick of timber, even for their own consumption.

Mr. PINCHOT. On their own homesteads?

Mr. COOK. Yes.

Mr. PINCHOT. I do not understand that.

Mr. COOK. I will be glad to look that up and let you know the name of the forester.

Mr. PINCHOT. I wish you would, and I will take that matter up right away, and will be glad to. Such a course would be a plain violation of our printed rules. Of course we have a large force, and a new policy. We have not got a perfect lot of men, and they do make mistakes now and then, although a very small number. If you will give me the information in regard to that I will follow it up.

Mr. HAWLEY. Here is a case: On the Santiam River there is fine timber. The timber runs 150,000 feet to the acre on much of that land and when the land is cleared it will raise two tons of timothy to the acre. What about a homestead on land like that?

Mr. PINCHOT. The law says that it must be more valuable for agriculture than for timber.

Mr. HAWLEY. How about that?

Mr. PINCHOT. It would be almost impossible for me to answer such a question without seeing the land.

Mr. HAWLEY. That land will raise 2 tons of timothy and 40 or 50 bushels of wheat to the acre.

Mr. PINCHOT. What is the land worth after it is cleared?

Mr. HAWLEY. It is pretty far away from a settlement. I do not know what it would be worth.

Mr. PINCHOT. As a rule land like that costs three or four times as much to clear it as it is worth after it is cleared.

The CHAIRMAN. Supposing that in the clearing you would reap the harvest of timber?

Mr. PINCHOT. I do not think the Government ought to give a man a bonus of 100,000 feet to the acre, or whatever it may be, to settle there.

Mr. HAWLEY. But this is on the floor of the valley. It is really agricultural land, but it has had an overgrowth of timber. Some of the trees will probably make 10,000 or 12,000 feet to the tree; but it makes fine agricultural land, produces good forage and grain crops, and raises good fruit, and makes good gardens.

Mr. PINCHOT. At a guess, from what you tell me, I should think it was more valuable for forest than for agriculture, but I am not sure; it is almost impossible to generalize. You would have to send a man there who knows the country and let him take into consideration the local conditions.

Mr. POLLARD. What do you base that opinion on, the adaptability of the soil for agriculture after the timber is removed?

Mr. PINCHOT. Yes; taking all of it.

Mr. POLLARD. Or, for instance, do you take a quarter section of land that is already practically free from timber, or do you take a quarter that is all timber, and then do you determine whether it

would be more valuable for agriculture after the timber is removed, or that it is more valuable for forest and timber?

Mr. PINCHOT. No; you have to consider its present timbered or non-timbered condition. It is the condition of the land now from which we have got to judge. For instance, there is a lot of land which can be cultivated after the timber is removed, and a great many claims are made that because the land can be cultivated after the timber is removed it is more valuable for agriculture. We can not hold that.

Mr. POLLARD. Would you let a man take a quarter section that is covered with heavy timber all over—

Mr. PINCHOT. Very seldom.

Mr. POLLARD (continuing). But after it is removed is valuable for agriculture? You would let him prove up on it?

Mr. PINCHOT. No, sir; very seldom, because most of that land is more valuable for timber than for growing crops.

Mr. POLLARD. In connection with that same thing, are there any restrictions of your Department, either in the rulings of the Department or provisions of law, that make it more difficult for a home seeker to take a homestead in a forest reserve than it is to take a homestead outside?

Mr. PINCHOT. Simply that under the provisions of the law he has got to make application.

Mr. POLLARD. To whom?

Mr. PINCHOT. First to the Secretary of Agriculture, under the law.

Mr. COOK. Does the law require that?

Mr. PINCHOT. Yes.

Mr. POLLARD. And designate the quarter that he wants?

Mr. PINCHOT. Designate the lot he wants. Outside he can make settlement first and make entry afterward.

Mr. GILHAMS. The only difference between making a regular homestead settlement and making one in the forest reserve is simply to get the consent of the Secretary of the Interior? Or of the Secretary of Agriculture?

Mr. PINCHOT. Of the Secretary of Agriculture.

Mr. GILHAMS. And have an examination made by his men?

Mr. PINCHOT. Yes.

Mr. POLLARD. Have you adopted any rules and regulations?

Mr. PINCHOT. Yes.

Mr. POLLARD. Governing such matters, which make it more difficult for him to get in than it is to file on this land outside?

Mr. PINCHOT. No, sir. He has simply got to make application first.

The CHAIRMAN. And then wait until there is investigation as to whether that is agricultural land?

Mr. PINCHOT. And in case the forest officer finds that it is agricultural land, he simply says for him to go ahead in case he wishes to occupy the land pending the listing.

Mr. POLLARD. To whom does he send the application?

Mr. PINCHOT. He sends it back to the Department.

Mr. POLLARD. The prospective settler?

Mr. PINCHOT. Very often he goes to the forest officer and explains what he wants, and the forest officer tells him that his application has to be made back here.

Mr. POLLARD. Then he goes to the Secretary?

Mr. PINCHOT. Yes. There has got to be some place where the application must be made, because of this question of priority; because the first man that makes application has a prior right.

Mr. POLLARD. And the only question that is passed on is whether the land is more applicable for agriculture than for timber?

Mr. PINCHOT. Yes; and if it is, the homestead act applies.

Mr. HAWLEY. If I understand the policy in relation to the forest reserve, it is to retain the forest cover, to retain the forest and make it a base for the retention of moisture?

Mr. PINCHOT. Yes.

Mr. HAWLEY. So that the water will gradually trickle down and keep the streams as nearly as possible at an even flow?

Mr. PINCHOT. Yes.

Mr. HAWLEY. Is it your theory in regard to the comparatively level floors of the upland valleys, as they are in the eastern and western portions of Oregon, in the Cascade Mountains, where the valleys of the rivers, even the smaller ones, have wide floors, that it is necessary for the retention of moisture to retain the forest cover on those lands?

Mr. PINCHOT. Where they are very high up it often is.

Mr. HAWLEY. But in comparatively low land?

Mr. PINCHOT. No; I do not think so. We have had a great many protests from the Reclamation Service against allowing settlers to take up claims high up in the mountains.

Mr. HAWLEY. Moose meadows?

Mr. PINCHOT. Yes; moose meadows, and things of that kind, on the ground that they would take up lands for the growing of hay that ought to be retained in forest.

Mr. LEVER. Do I understand that the object of the forest reserves is to protect the water supply, to protect the streams?

Mr. PINCHOT. That is one of the objects.

Mr. LEVER. What are the others?

Mr. PINCHOT. One of the most important reasons for maintaining forest reserves is the production of timber. The protection of the water and the production of timber are the two important reasons.

Mr. LEVER. The production of timber and the protection of water?

Mr. PINCHOT. The conservation of the water and the production of timber.

Mr. WEEKS. At what do you estimate the value of the lands that are in the forest reserves now?

Mr. PINCHOT. We figured up last year, and I have not made a new estimate since, that the total value of the national forests was about \$1,500,000,000. They are growing in value with enormous rapidity. We figure that we have something over 360 billion feet of timber, which is worth at least \$2 a thousand feet, and there are others.

The CHAIRMAN. Before we get too far away from it, going back to Mr. Cook's inquiry, I wish you would state categorically the policy and practice in your Bureau with reference to the privileges given homesteaders in the matter of using wood or timber from the forests?

Mr. BEALL. Outside of their homesteads?

The CHAIRMAN. Yes.

Mr. PINCHOT. I think there must be a distinction between the homesteader who has no timber on his own homestead, but needs some, and the homesteader who has timber on his homestead. The

homesteader who has timber on his homestead has exactly the same right to use it inside of the national forest as he has outside. He holds under the national homestead law inside of the forest as he does outside of it. There is no difference there. On the other hand, the homesteader who has no timber on his homestead is given free timber by the Forest Service for his personal needs.

The CHAIRMAN. Does that extend to his personal needs in the matter of building fences?

Mr. PINCHOT. Fences and corrals and barns, and for firewood, and so on, and so on.

The CHAIRMAN. What restrictions are put upon that?

Mr. PINCHOT. He must get a permit from a ranger, and every ranger is authorized to give those permits.

Mr. HAWLEY. The homesteader pays nothing?

Mr. PINCHOT. He pays nothing for the wood.

The CHAIRMAN. Then, under what circumstances is a homesteader allowed to cut timber without getting a permit, as you spoke of in your answer to Mr. Cook?

Mr. PINCHOT. He must not cut timber outside of his own homestead in the national forest. He must not cut timber except on his own homestead.

The CHAIRMAN. Then I think clearly there was a misunderstanding between yourself and Mr. Cook, when he asked his question a moment ago and stated to you that to his personal knowledge some men had been refused the privilege of cutting wood from the forests without a permit, and you told him that if he would give you the name of the forester you would look it up.

Mr. PINCHOT. I understood Mr. Cook to say that he was prohibited from cutting timber from his own homestead.

Mr. COOK. Both.

Mr. PINCHOT. Both?

Mr. COOK. Yes.

The CHAIRMAN. I simply wanted to get that matter cleared up.

Mr. PINCHOT. May I state the case again?

The CHAIRMAN. That is the reason that I asked for that. I would like to have it all at once in the record, so that we would not have to read over twenty pages to find it.

Mr. PINCHOT. It is like this: If a man has the timber on his own homestead inside of a national forest, he may cut that timber precisely as if his homestead were outside of a national forest. The law provides for the amount of cutting he may do, and so on. We have nothing to do with that. Under the homestead law cutting is restricted until after the homesteader has acquired full title to clearing for tillage and to use of timber for improvements. He may handle his own homestead inside of the national forest in every respect exactly as he would outside. But if the homesteader has no timber on his own homestead, and needs some timber, then we require that he shall ask permission to cut it, because it would not be safe to turn everybody loose in the national forests to cut without supervision. No charge is made for that permit, and during the past fiscal year more than 15,000 such permits were given without charge.

The CHAIRMAN. Just one other point I think ought to be brought out, and that is what restriction goes with that permit as to the character of the timber he shall cut?

Mr. PINCHOT. The restriction differs in accordance with the condition and needs of the forest in different places. As a rule, what is done is that the forest ranger marks out a certain area and he says, "Now, anybody who wants house logs in this community, go to this particular place, and get them there. Get your firewood there." Each homesteader may take \$20 worth of standing timber during the year.

Mr. HAWLEY. What do you mean by \$20 worth?

Mr. PINCHOT. It depends on the place.

Mr. HAWLEY. Then it would be more in one place than in another?

Mr. PINCHOT. Yes, much more; but as a matter of fact, as a matter of practice, the amount that they take is only about \$5 worth apiece, and we are very careful, and where a man is building a new house or barn and needs more than \$20 worth, the forest officers have instructions to let him have the rest. We are doing all we can in this way and other ways to help the homesteader get a home.

Mr. RUCKER. You give him timber for saw purposes, to build his barn and house?

Mr. PINCHOT. Yes.

Mr. RUCKER. He can cut timber free to build his entire house and barn from the ground up?

Mr. PINCHOT. Yes.

Mr. COOK. Would he be required to pay for that under the stumpage act?

Mr. PINCHOT. No, sir; if a settler wants a little amount of timber for his own use he does not pay for it. If he wants a considerable quantity, he does pay for it.

Mr. LAMB. What is it, a dollar a thousand?

Mr. PINCHOT. On the average it is something over \$2.

Mr. POLLARD. Suppose a man cuts \$50 worth; what do you do?

Mr. PINCHOT. We practically never have that case. We get along in a friendly way with the settlers, and they cut what is about right.

Mr. POLLARD. You say a settler can get \$20 worth of lumber. Suppose a settler wants to build a house and barn?

Mr. PINCHOT. Yes.

Mr. POLLARD. He can not get enough to build a house and barn?

Mr. PINCHOT. That is stumpage.

Mr. POLLARD. That is a dollar a thousand?

Mr. PINCHOT. It varies in different places.

Mr. COOK. It is more than that in my State.

Mr. POLLARD. Stumpage; is that true?

Mr. PINCHOT. Yes.

Mr. POLLARD. Suppose a settler has no timber on his homestead at all and desires to get his fuel from the national forest reserve; what rules do you have governing that? Is he allowed to go in there and cut any full-grown tree that is adapted to his purpose, that will make a saw log?

Mr. PINCHOT. No.

Mr. POLLARD. Or does he go in and get the trees that have fallen down?

Mr. PINCHOT. Or what you might term waste timber. If he wants fuel, he gets almost in every case dead timber. There is a vast amount of fire-killed timber all through the national forests, and he gets that.

Mr. HAWLEY. And taking that out benefits the forests?

Mr. PINCHOT. Yes; we like to get it taken out as fast as possible. Are there any other questions?

Mr. LEVER. You have 161,000,000 acres under the forest reserves?

Mr. PINCHOT. One hundred and sixty-two million acres.

Mr. LEVER. That gives the Federal Government a practical monopoly on the timber supply of that country; is that a fact?

Mr. PINCHOT. No; there are places where all the timber is in national forests, but the vast bulk of the merchantable timber, or if not the vast bulk of all the merchantable timber the vast bulk of the accessible merchantable timber, has all passed into private hands.

The CHAIRMAN. How much is that which is in the hands of private owners?

Mr. PINCHOT. That is hard to say. I would say that the vast bulk of the accessible timber lands have passed into the hands of private owners.

Mr. LEVER. How do you get the timber into the market? What is the law governing the cutting of that timber?

Mr. PINCHOT. Suppose you wanted to cut 10,000,000 feet of timber, what you would do would be to find first the body of timber you wanted. Then you would talk it over with the forest supervisor and agree with him as to what you thought was the right price, and as to the conditions that ought to be observed to protect the forest and to protect the young growth, and then the proposition would be sent back here for examination by experts, who are not office experts but field experts, and finally, after an agreement had been reached between them, the timber would be advertised, and if your bid was the highest bid, you would get it. If not, it would go to whoever the highest bidder was.

Mr. LEVER. Then, as a matter of fact, the timber in these reserves is not withdrawn from the market?

Mr. PINCHOT. Not at all.

Mr. LEVER. It is there for the purposes of the trade, except that you gentlemen supervise the cutting of it?

Mr. PINCHOT. That is it, exactly. We are selling large amounts of it.

Mr. LAMB. But as I understand, you do not sell it except where by reason of its age it ought to be sold?

Mr. PINCHOT. Precisely; we sell the ripe timber.

Mr. LAMB. What proportion of the timber in the forests is reaching that stage, as to necessity of sale?

Mr. PINCHOT. Roughly, I should say one-third of it.

Mr. HAWLEY. What regulation do you have regarding the waste, that is the tops?

Mr. PINCHOT. We require that all tops or pieces of tops and small branches 6 inches and under in diameter, shall be piled, often in narrow piles the shape of this table, and that high [indicating] so that after the cutting is over we can burn those piles and get that menace out of the way.

Mr. HAWLEY. Do you have any regulation as to how far up the tree they shall go?

Mr. PINCHOT. That is carefully specified in each contract, how high up they shall go, how high the stumps shall be, and what they shall use for ties, and so on.

Mr. COOK. There is a good deal of timber you want to hold, is there not?

Mr. PINCHOT. Certain of it we would a great deal rather hold. Where the timber is ripe and is beginning to go down hill, we would prefer to sell it.

Mr. McLAUGHLIN. Trees get ripe just like any other crop?

Mr. PINCHOT. Yes.

Mr. McLAUGHLIN. And when they reach that point they begin to deteriorate?

Mr. PINCHOT. Yes.

Mr. LAMB. They never let them get ripe in my country.

The CHAIRMAN. I understand your principle to be to sell small quantities of wood or timber without submitting it for bids. Would you state the policy in that respect?

Mr. PINCHOT. The law provides that everything over \$100 in value must be advertised, but that sales for less than \$100 may be made without advertisement. That is a very important provision, because there are many small men scattered through the national forests who want some timber right away, and we authorize the supervisor to let such a man have what he wants. We call it a class B sale. The supervisor can make that sale promptly, under such stipulations as his own judgment prescribes, so that we do not have to wait two or three months as we do to get a larger sale through.

Mr. McLAUGHLIN. I understand Mr. Pinchot's hearing is to continue and cover all the features of his work. I do not know the range it is going to take, but this Service is costing a good deal of money, and I apprehend that a larger amount will be necessary from time to time, aggregating a very considerable amount of money. I understand also that the Government is getting considerable revenue, and that later that revenue will increase. Will this inquiry include that subject, or will a suggestion be necessary to Mr. Pinchot for the preparation of some figures to show what the revenue is or what the prospect of an increase of the revenue is?

The CHAIRMAN. I think Mr. Pinchot of his own volition would reach that.

Mr. PINCHOT. I have it all right here.

Mr. McLAUGHLIN. Very well.

(At 12 o'clock m. the committee took a recess until 2 o'clock p. m.)

COMMITTEE ON AGRICULTURE,
HOUSE OF REPRESENTATIVES,
Thursday, January 23, 1908.

The committee met at 2 o'clock p. m., Hon. Charles F. Scott (chairman) in the chair.

**STATEMENT OF MR. GIFFORD PINCHOT, CHIEF, FOREST SERVICE,
DEPARTMENT OF AGRICULTURE.**

The CHAIRMAN. Mr. Pinchot was proceeding, when he was interrupted by numerous questions, to explain to the committee the organization of his Bureau. I believe I will ask him to continue that explanation, and I would suggest to members of the committee that

they withhold questions touching the policy of his Bureau until Mr. Pinchot has concluded his explanation of the organization. He will then take up general questions relating to the Service, and we can discuss those with him at whatever length we desire. Of course I do not mean to shut off any questions that may be needed to elucidate the particular point that he is trying to bring out at the time, but I merely suggest, in the interest of expediting the business as far as possible, that we let him cover this organization here without any more interruption than is necessary.

Mr. PINCHOT. If I understand you, I am to run over the organization rapidly and then subsequently take up the questions of policy which relate to the different branches of the Service.

The CHAIRMAN. That is what I intended.

Mr. PINCHOT. I had gotten under the branch of operation, office of lands. I have explained something about boundaries, something about settlements. The section of claims deals with ascertaining and reporting the facts as to various types of claims inside of the national forests. Instead of sending special agents, for instance, to examine various claims in the national forests, the Land Office asks us to ascertain the facts and report them for action. But, again, we make no decision whatever; the decision rests with them.

Status is a very important section. The record that is in the Land Office is not usable for our purpose and we are obliged to secure from it for a record of our own the facts as to ownership and claims—that is, any kind of rights that have been acquired to any land in any national forest. We have to know, of course, exactly what lands are ours and what are not. For that purpose we maintain an office of status. I will come to the illustrations in the policy later. We simply ascertain the ownership of the lands in the national forests, of which 15 per cent do not belong to the Government, consisting of railroad land grants and claims of various kinds.

The section of special uses follows. It has to do with the various kinds of use made of national forests for special purposes. There is an extremely large number of these, and I will read briefly some of them to show how extensively the national forests are used. Among those for which charges are made are the following: Aerial tramways, agricultural lands of certain kinds, for instance, pasture lands, cabins, slaughterhouses, stage stations, transportation lines, wood yards, and so on. National forests are used in all these ways, and in addition there are various houses, buildings, cabins, city reservoirs, conduits, fences, dams, experiment stations, hunting permits, which means a hunting cabin permit, railroads, and so on; an enormous number of uses of all kinds made of the national forests, and the section of special uses handles those things in the office.

The office of organization, under operation, deals with the actual conduct of business of the national forests, which I will discuss a little in detail later on.

Passing, then, to grazing; the branch of grazing deals with the stock running on the national forests, of which there is a very large amount indeed. Much of the land in the national forests has been burned over, and a great deal of that land furnishes good pasturage. There is no reason why it should not be used. On the contrary, it is very desirable that it should be used, and we have, on the whole, at present, the largest use of the national forests made in that way.

The CHAIRMAN. Can you state how many of the various kinds of animals you have on the national forest reserves?

Mr. PINCHOT. Yes; there are about 1,200,000 cattle and horses, and 6,500,000 sheep and goats grazed on the national forests.

The two offices under the branch of grazing are control and development. Control has to do with the issuance of permits and the actual management of the grazing lands; while development is concerned with the character of the forage. Under control there is allotment, adjustment, and permits. Allotment has to do with the number of stock; adjustment has to do with the settlement of difficulties, and permits with the actual issuance of the permits. Under development are fences, forage and water. We are constantly attempting to increase the number of fences, improve the quality of forage, and develop water on the national forests, so as to make the forests themselves support more stock, and although most of them when we got them were seriously overgrazed, we have already begun to increase the number of stock on a considerable portion of them. During this coming year there will be increases in the number of cattle and horses on fourteen national forests, increases in the number of sheep on sixteen—those are the ones which have been longest under our care—while there are decreases in the cattle and horses on sixteen and decreases in sheep on nineteen, because the range was overstocked at the time the national forest was created. The whole question of fees I will leave until the matter of policy comes up.

Under silviculture is included everything which relates to timber production on national forests—the growth and care of the timber, and its extension by planting. The work of the branch of silviculture is conducted in three main offices, extension, silvics, and management. Extension deals with the spread of forests, by planting or by protecting the land against fire. Silvics deals with the scientific study of the character of the tree itself in the forest. To make the forest behave as he wants it to, the forester needs the same kind of information about trees that a city mayor should have about the people who live in his city. You have got to know the habits, preferences and methods of behavior of the trees before you can handle them properly, and silvics is collecting that information. Management deals with the actual handling of the timber, decides how it is to be cut, controls the cutting, and studies general questions relating to timber production along with the harvesting of the crops.

Under extension, briefly, there is the section of planting, which deals with the actual planting work; the section of reconnaissance, which studies the need of new planting, and the section of cooperation, which deals with the planting by private individuals and States, where we give advice but do not do the work. Under management we have cooperation in the same way; we are assisting a very large number of timber-land owners in the handling of their property, for which they pay the expense. Management includes also timber sales which takes care of the actual timber sales in the forests, reconnaissance, which includes the studying of the forests to find out where cutting should be done, and the atlas, which is a very important part of our work. The atlas, of which I have two volumes here, is a record of everything that we know about each national forest, and about the service as a whole. The volume before me is a summary of all the information we have about the national forests

for the present year, and at the end of the present year—this comes up to the 1st of January of the present year—this will be filed away and a new volume prepared for next year, so that we shall have an absolute record or history of everything that goes on in the national forests and the condition at the end of every calendar year. I should like very much if from time to time the members of the committee could examine this volume which I have here, because it shows, I think, that we are pretty thoroughly aware of the condition of affairs in the national forests, and the progress of the work.

The branch of products deals with the use of wood in all its forms, and there has been added to it certain other work because that was a convenient place to put it.

Mr. McLAUGHLIN. The use of wood by your department?

Mr. PINCHOT. No; by the whole nation. I might, at the risk of talking about policy, say there that we recognize very fully that the larger part, four-fifths, of the timber land of the United States is in private hands, and unless we can influence the management of those lands, so far as the general welfare of the country is concerned, we shall fail completely to avert a timber famine and do what we ought to do.

Mr. LEVER. I believe you are quoted as saying that we will have a timber famine in about thirty years at the present rate of cutting?

Mr. PINCHOT. We will have a timber famine before that; there is no question about it. I want to take that matter up in detail, if I may, a little bit later.

In the office of wood utilization we have four sections called drafting, computing, wood chemistry, and wood uses. I will give a brief statement about each of them.

The section of drafting makes all the maps, charts, and drawings used in every branch of the Service, and large numbers of them are required. The section of computing does the figuring for the Service. Many measurements must be made in connection with the testing and seasoning of wood, the sales of timber on the national forests, and in all studies of tree growth. We must know how fast our trees grow, what form they take, and how many logs to a tree and the amount of lumber they will yield. The section of computing makes all the calculations arising from these measurements and combines them into tables which are essential to forest work.

The purpose of the section of wood chemistry is, primarily, to study the utilization of waste wood and less valuable woods by chemical means, and to apply the science of chemistry to the solution of a large number of other problems of vital importance in forest economy. In 1906 there were used in this country 3,661,176 cords of wood for pulp, of which 68 per cent was spruce. Spruce commands a high price for lumber, and a suitable substitute should be found in cheaper material. Private companies have experimented with other woods, but their experiments have in a large majority of cases proved failures, because of the expense of using their mill for experimental purposes. The Forest Service has a miniature pulp mill, where a large number of experiments may be carried on at comparatively small cost. The experiments during the past year have shown that a merchantable pulp can be made from eleven species of wood which, up to the present time, have received little or absolutely no consideration.

Three of these, white fir, Engelmann spruce, and lodgepole pine, occur in large quantities in the national forests. Here is one sample [exhibiting to committee].

In the sawmill refuse and logging operations in the yellow-pine districts in the South there is annually being wasted a large amount of turpentine which, the Forest Service believes, could be recovered and sold, to say nothing of a vast quantity of wood fiber and other materials. Various methods have already been devised for the recovery of the turpentine, but only in a very few instances has any degree of success been obtained. The products have rarely been uniform and, on this account, have found no great demand in the market. During the past year the Service discovered a method by which the products from the various processes could be accurately judged and classified. We have also shown that with suitable apparatus and proper operation a quality of turpentine can be obtained from the waste pine wood of the South which is practically identical with the turpentine obtained by tapping the live tree, and should be of equal value.

The work of the section of wood chemistry also includes a study of the chemical composition of treated and untreated timbers, leaching studies to determine the changes in composition which takes place in seasoning operations, a study of the utilization of waste for the production of tanning extracts, and other problems in relation to the chemistry of wood.

The section of wood uses, by means of a permanent field organization, carries on four lines of work, as follows:

First. A study of general and local market conditions, the chief purpose of which is to keep the Service fully informed of the conditions in various markets in which national forest timber is consumed.

Second. A study of the wood-using industries, to secure authoritative information on methods of manufacturing, what kinds of wood are giving best satisfaction, and the requirements of the industries. Efforts are also made to induce manufacturers to experiment with untried species for the purpose of securing a more complete utilization of forest products:

Third. Experimental work, including timber tests, experiments to determine the best methods of seasoning, etc. The timber tests have been very helpful in furnishing to engineers and architects reliable data on the strength of different species and grades of timber. They have also thrown light on grading rules by showing the influence of factors, such as knots, shakes, rate of growth, etc., on the strength of timber. The data thus far secured have been of great help to the American Society for Testing Materials in drawing up standard specifications for structural timber. The work has also furnished data on the effect different methods of drying and preserving have on the strength. Tests on vehicle woods in the form of spokes, wagon axles, harvester poles, etc., have been of great service in showing the relative value of different species used in vehicle manufacture. The woods best suited for packing boxes, insulator pins, and the spike-holding power of different species of railroad ties have also been studied.

Fourth. In cooperation with the Bureau of the Census, the section of wood uses has compiled statistics showing the annual output of forest products by species and states, and the amounts consumed by the principal wood-using industries. These statistics have formed the basis of Forest Service circulars which have been widely distrib-

uted, and have proved of great value in concentrating the attention of the public at large on the vital importance of a more conservative use of our forest resources.

Mr. HAWLEY. Did you say that these are woods that have never been used for pulp?

Mr. PINCHOT. Most of them never have been used for pulp before.

Mr. HAWLEY. They have been using white fir out in Oregon for pulp for a long time.

Mr. PINCHOT. I do not say that all of them have not been used, but I say that most of them have not. I know that white fir in the West and balsam in the East have been used, but a great many of these have never been used to any extent, and most of them not at all.

The office of wood preservation deals with the methods of preserving wood from decay and mechanical wear. The rapidly decreasing timber supply and the steady demand for construction timbers have very materially increased their price, so that now there is a constant and growing demand for treated wood, and for knowledge on the subject. There were treated last year in the United States about 1,120,000,000 B. M. of lumber. A little over 10 per cent of all railroad ties are treated. About fifty-five plants are now in operation, and new ones are being constructed. Companies begin to realize fully the economy of using treated timber, so that this business undoubtedly will become of greater and greater importance.

The Forest Service has carried on a great many experiments in cooperation with railroad, telephone, lumber, and mining companies, state universities, and ranchmen, to help them work out their specific problems, and to show them the value and economy of treating. The larger companies are asked to undertake most or all of the expense of cooperative work with them.

These experiments have resulted in developing what is known as the open-tank process, and have succeeded in greatly reducing the cost of treatment and bringing it within the sphere of the small consumer. Heretofore the process has been so expensive that only the large consumers of timber could afford to use it. It was absolutely beyond the reach of the farmer and the ranchman. The Forest Service has shown that with the expenditure of a few dollars a plant can be erected that is admirably adapted to treating posts, poles, etc., and that their length of life can be increased two or three times. This not only results in a final saving to the consumer of timber, but decreases the drain put upon our forests and enables the cheaper and more abundant, or "inferior," woods to be brought into use.

To show you the efficiency of this new process I have here a number of samples cut from wood we have treated [exhibiting to committee].

As a result of our work a number of companies have adopted our recommendations for handling their timber. One company is now erecting a commercial treating plant according to the general plans we have made. Requests for assistance and advice are constantly being received, and we are giving aid to all just as fast as our means permit.

Mr. POLLARD. What preservatives are you using?

Mr. PINCHOT. Creosote, and other preservatives.

The CHAIRMAN. Here is a good place to inquire whether the work you are doing duplicates the work that the Bureau of Plant Industry is doing?

Mr. PINCHOT. Not in any way whatever. They are dealing with the evidence end of it, and we are dealing with the technical processes, and we are working with them in entire harmony and cooperation.

The CHAIRMAN. You know what they are doing?

Mr. PINCHOT. We know what they are doing.

The CHAIRMAN. And you also know what they are doing in the way of distilling woods and getting turpentine; you know that?

Mr. PINCHOT. No; I did not know that.

The CHAIRMAN. I think they said to us that they were conducting experiments along that line.

Mr. PINCHOT. It is new to me.

Mr. HAWLEY. You mean conducting experiments to get wood alcohol, Mr. Chairman.

The CHAIRMAN. I may be mistaken about it; I will look it up and let you know.

Mr. PINCHOT. These pieces of wood smell rather strong.

Mr. HAWLEY. We are getting used to that.

Mr. POLLARD. How much can you add to the time that wood can be used after they are treated with this creosote?

Mr. PINCHOT. I can give you some actual figures on that. In general, we can increase it from two to three times, sometimes a good deal more. The average railroad tie in this country lasts somewhere between five and seven years. A well-creosoted tie, properly creosoted, does not decay at all, but wears out, and there are very many creosoted ties in the tracks in Europe that have been there for twenty-five or thirty years.

Mr. POLLARD. Are there any railroads in this country that are following that policy?

Mr. PINCHOT. A very considerable number.

Mr. POLLARD. What part of the country?

Mr. PINCHOT. All over the country.

Mr. POLLARD. I have not seen a tie yet on a railroad that I thought had been creosoted.

Mr. PINCHOT. Mr. Pollard, if you care to look, here is a list of the treating plants in the United States, with the processes which they are using, and many of the great railroads have treating plants of their own.

Mr. POLLARD. They are not following it, as a rule, are they?

Mr. PINCHOT. The majority of ties are not yet treated, but they are treating them just as fast as they can get the capacity. The thing is coming in without question.

Mr. POLLARD. Do you know of any railroad that makes a practice of treating all of its ties?

Mr. PINCHOT. I do not think that any railroad has sufficient capacity yet for treating all of its ties. You see the annual tie crop is something like 100,000,000, and the plants have not been increased rapidly enough to meet this demand, but they are being increased rapidly.

Mr. POLLARD. I live on the Missouri Pacific Railroad in Nebraska, and I have seen many a cord of ties shipped, and I have not seen a tie that has been treated. Going about all over my State I have not seen a tie that has been creosoted.

Mr. PINCHOT. There is not a treating plant in Nebraska, but the Burlington Railroad uses a large number of treated ties in Nebraska.

They are treated by the zinc-chloride process. The nearest plant that I know of is at Laramie, Wyo. The Burlington has a large plant at Sheridan, and the Union Pacific has one at Laramie. There are plants, I may say, in Alabama, California, Illinois, Indiana, Louisiana, Mississippi, Massachusetts, Michigan, Missouri, Minnesota, New Mexico, New York, Washington, Wyoming, and several other States I see here, and in most of those an average of about four or five to the State.

Mr. McLAUGHLIN. Where is the one located in Michigan, and by what railroad is it operated?

Mr. PINCHOT. There are two plants—at Escanaba and Bay City. The one at Escanaba is owned and operated by the Chicago and Northwestern Railroad, and the one at Bay City is a commercial plant.

Mr. HAWLEY. In the treating plant can they prevent checking? Unless that was treated all the way through it would rot.

Mr. PINCHOT. That, of course, is a narrow piece.

Mr. HAWLEY. I know this particular piece is, but there is a tendency of this to check, is there not?

Mr. PINCHOT. The way we handle that is to season the wood thoroughly before treatment. We have done a great deal of work in seasoning.

Mr. HAWLEY. And the checks are filled with creosote?

Mr. PINCHOT. Yes; the checks are filled with creosote. We have succeeded in putting very much less creosote in the wood than by other processes. In some cases we have reduced it from 18 pounds to the cubic foot to 3 pounds to the cubic foot, and yet we get as good a penetration and almost equally good results.

Mr. LEVER. And this gives to the creosoted tie almost indefinite life?

Mr. PINCHOT. Yes; it gives it a very great addition of life. The railroads have been paying a very considerable portion of the cost of experiments along this line so far as ties are concerned, and telephone companies the cost so far as the poles are concerned.

Mr. HAWLEY. And the railroad is also saved the cost of replacing ties and the danger of broken ties?

Mr. PINCHOT. Yes; very much.

Mr. McLAUGHLIN. A word as to the manner in which those plants are operated. There are permanent plants located at some particular points, and all ties have to be brought there and treated?

Mr. PINCHOT. Yes.

Mr. McLAUGHLIN. Ordinarily a company buys ties at different points all along its road?

Mr. PINCHOT. Oh, yes.

Mr. McLAUGHLIN. It would not be able to do that or to use them until after they had been shipped to one point?

Mr. PINCHOT. Ties are moving much farther, as the years go by, from the point of origin all over the United States, and they are bringing them to these treating plants and sending them out. I have found the table that I was looking for as to the treatment of the ties, and the corresponding length of life, which shows the advantage of treatment for the different kinds of wood. As I have said, the total output of all the plants in the United States is about 1,120,000,000 feet B. M. per annum. This includes all kinds of timber treated.

Mr. McLAUGHLIN. The treatment amounts to that?

Mr. PINCHOT. The output of treated timber.

I have spoken a word about preservation. To proceed under the head of the Office of Publications, there are five sections. Articles is the preparing of special statements on various subjects for printing and circulation, or otherwise. Education is where we are dealing with forestry in the schools and making the principles of forestry known. Review is the editorial correction of material prepared in the Forest Service for our bulletins, and so on. Printing is seeing it through the press, and distribution is the mailing list, the envelopes, and so on.

Mr. POLLARD. In connection with that may I inquire if it is the custom of your Department to prepare the matter which is sent to the newspapers?

Mr. PINCHOT. Yes.

Mr. POLLARD. And to press bureaus?

Mr. PINCHOT. Yes.

Mr. POLLARD. You have a press bureau, have you?

Mr. PINCHOT. No; we have not a press bureau, but I am very glad you called that up. If the chairman will permit me to take that up at this point, I should like to say a word on it.

The CHAIRMAN. Certainly.

Mr. PINCHOT. We believe that it is the business of the Forest Service to see that people know about the necessity for forestry in the United States. We have done our best to reach a sufficient number of people to influence public opinion generally through our own publications, but we have entirely stopped, or practically entirely stopped, the publication of bulletins and circulars, which cost over about 1 cent apiece. In other words, we have stopped publishing bulletins that cost 5 or 6 or 8 or 10 cents apiece and have gone to publishing little leaflets of five or six pages, which cost from a half a cent to a cent apiece, distributing very large numbers of them—that is, popular material.

Mr. COCKS. When the newspaper publishes it, do you pay them advertising rates?

Mr. PINCHOT. We have never paid a newspaper for anything in our lives, except for advertising timber sales and publishing other advertisements that are required by law.

The CHAIRMAN. As I understand it, Mr. Pinchot, you endeavor to get it into shape in which newspapers can use it, and will be glad to use it, the information that otherwise, or heretofore, has been published in the nature of a bulletin?

Mr. PINCHOT. Precisely. We are doing two things. You are exactly right. We are trying, in the first place, to meet the need by printing great numbers of these very cheap publications, but we fail to meet the need in that way. Nobody can. We have printed and distributed something over 4,000,000 this year of these little cheap leaflets, but in a nation of eighty-five or ninety millions that does not count very much. We have, therefore, made up our minds to do this, and are now doing it; we prepare the news—the valuable information that is news—in such shape that the newspapers will take it, not in any sense puffing our work; simply a definite statement of facts. The newspaper men come around and get that and print it. In that way we are getting before the people, with an utterly insignificant cost—two men do all this work, and they do not

spend their whole time at it—material in an amount which would cost us thousands upon thousands of dollars every year to get out if we mailed it ourselves.

Mr. POLLARD. What I am trying to get at is this: What is your object in giving this information to the papers and getting it to the people that way? What is the object of it?

Mr. PINCHOT. The object of it all is to educate the people of the United States to the importance of forestry, of forest preservation, and to teach them how to make the best use of forests and forest products.

Mr. POLLARD. Do you mean people who are living in sections of the country where there are forests, to give them information that will enable them to help preserve the timber they have?

Mr. PINCHOT. Yes, and to plant timber where there is not any.

The CHAIRMAN. Would this not also illustrate your work in that line? When you discovered this process of creosoting, for the purpose of extending the life of fence posts and telegraph and telephone poles, you prepared a newspaper article setting forth the facts in relation to that, and the newspapers got it widely into circulation—matter that was of great importance to the people?

Mr. PINCHOT. Yes; and then we would put the same matter in different ways, so that the information would go out again and again.

Mr. POLLARD. Coming back to this creosoting, I would like to get this information, Mr. Chairman. I want to find out this, how long has it been since the Department has established—and I understand that is the case—that creosoting will preserve wood from two or three times as long as it will remain useful without this treatment?

Mr. PINCHOT. That has been known for twenty or thirty years, I should think, but our contribution is that we have discovered a newer and a cheaper method of applying the creosote. The main reason why creosoting has never been used in this country is not that we did not know that it was the best method, but that it was too expensive. The creosote was too expensive and the method of application was too expensive. What they did before we discovered this method was to have long cylinders, 100 to 180 feet long, into which they ran the wood, loaded on trucks, and applied steam under pressure. They then pumped in their preservative, with various modifications as to time, heat, and pressure. Afterwards they took the wood out and dried it off. It cost a great deal of money and they injected a great deal of creosote. The amount of creosote per cubic foot is one of the most important points in this connection, because that was what governed the expense. We found that if you take any kind of an open tank and heat the creosote up to or over the boiling point of water, and put your wood in, this happened: The boiling point of creosote is higher than the boiling point of water; consequently the hot creosote vaporizes into steam most of the moisture in the wood and also expands the air contained in it.

Mr. McLAUGHLIN. At what point does creosote boil?

Mr. PINCHOT. At something like 400° F. I have forgotten what it is, but it is very hot; that is my recollection, 400° F. But I know it is much higher than water. Then, by simply letting the tank cool off with the wood in it, atmospheric pressure (the steam and air having gone out of the wood) forces the creosote into the wood to take the place of the water and air expelled. Thus we get a very

cheap method. We can get much less creosote going in for the same penetration than was possible with the older way, and we get a method that does not require expensive or complicated apparatus. The farmer can treat his fence posts perfectly well with this method at very little expense, and without having to know anything about chemistry or engineering.

Mr. BEALL. How long does it require to treat the post?

Mr. PINCHOT. From four to twenty-four hours, depending upon the wood used. The usual process is to charge the tank with the wood in the morning, run the heat up during the day until it reaches the desired temperature, leave it there a little while, shut the heat off, leave the tank during the night, and take the wood out in the morning, so that this treatment takes about twenty-four hours.

Mr. HAWLEY. Do you use the same form of apparatus that the Bureau of Plant Industry does, taking a big hogshead or barrel or something of that kind, running a pipe in, and building a fire at the end of the pipe?

Mr. PINCHOT. No; we generally heat with steam. We have been treating telephone poles and fence posts, and so on.

Now, Mr. Chairman, I have run over briefly the organization of the Service. With your permission I will take up the general plan of handling national forests first.

The national forests are handled by forest supervisors, rangers, and forest guards, assisted by a certain number of technical men. The organization of any given national forest would be, say, one supervisor, one assistant supervisor, ten rangers, and, during the summer time, six or eight forest guards. The supervisor would have a clerk to help him in the office, and he would be assisted by a trained forester, who would give him advice as to the method of cutting his timber, and so on. Supervisors are not technically trained men for the most part, but they are practical men, born and brought up in the region where the forest lies, and have come in, as nearly all in the Forest Service have, under civil-service examination.

This organization is devised with the definite idea of getting just as little work done in Washington and just as much in the field as possible. In dealing with as large an area as this, and one as widely scattered and with as many different kinds of demands as we have to meet, it is just as important to do business promptly as it is to do it well. If a man wants to build a ditch or a trail or a road, or to buy some timber, we have got to have some sort of an organization that will enable him to get permission to do what he wants to do quickly, if it is going to do him any good. Consequently the object is to put all possible responsibility on the field men and give them as free a hand as possible, and keep control of them by inspection. The central feature of the Forest Service is its inspection, so far as the handling of the national forests is concerned. You will see that these forests are divided into six inspection districts, and in each place there is a head inspector with other men under him to help him, and by that system we keep in very close touch with everything that is going on. Our inspection of our men is not by their reports, but it is by learning the actual condition of things in the field.

There are two things that are absolutely necessary for the proper handling of a piece of field work like this. One of them is to put all the responsibility on the men in the field so far as possible; the other

is that the men in the office must have the field point of view. I want to make that very strong. There are bureaus in Washington, which I will not name, where every man in the office stays in the office all the time and every man in the field stays in the field all the time. The consequence is that the office man has one way of looking at the work and the field man another way, and opposition grows up. The office man, finding the field man much less expert in the details of paper work than the office man, gets into an attitude of mind where he likes to catch the field man; and the field man, feeling that the office man does not understand him, does not realize what his needs are, gets to feel bitter against the office man. I am not talking about any bureau in the Department of Agriculture at all. Our forests are handled by men who are about half the time in the field and half the time in the office—I mean the office force in Washington. The organization of them is under the branch of operation and office of organization, with a chief and an assistant chief, both of whom are field men with long experience, and then for each of these six districts a man to handle the work of that district. A supervisor wants certain things for which it is necessary that he should send to Washington. There must be somebody to handle that work. Those six men in the office are not office men, but they are forest supervisors, field men, brought into Washington temporarily for that purpose, having a supervisor's knowledge of what is going on and the supervisor's point of view. That is a very essential part of our work, and I want to make it very strong. We are handling this work in the national forests absolutely from the field point of view.

In addition to the actual business of the forests, which is under the charge of operation, each forest has work going on under grazing, under silviculture, and many under products. Not all of them have work yet under products, but a great many of them have. The forest supervisor is the man on the ground in full charge. Every man who goes out to that forest is a subordinate to the supervisor, unless he is an inspector. The supervisor gets his orders as to grazing matters from the chief of grazing; as to planting from the chief of extension; as to management he gets his orders from the chief of silviculture. In other words, there are experts in Washington in charge of each line of work on the national forests in addition to the regular routine management. That, I think, is an important feature of our organization. These forests have got to be handled from a high-grade, technical point of view if they are to be successful, as well as from an absolutely competent and trustworthy business point of view. Accordingly each supervisor in dealing with a special subject gets his orders from the man who is the best expert in that line that we have. The criticism would naturally occur to you, Does not the supervisor get confused receiving orders from so many different people? As a matter of fact, we have absolutely no friction of that kind at all. The system works with entire smoothness, and when you come to think of it, even if the organization had a branch of grazing, a branch of silviculture, a branch of products under it, it would be in each case the head man in that particular line from whom the orders originated. So that the system practically would be the same. Our system works without a hitch. The supervisors do not get confused, and the advantage of having men who are experts in charge of these various lines of work is very large.

I will speak now for a moment, first, of grazing, and then of the timber-selling work, and the situation as to the actual amount of timber in the country. We have, as I said, about 6,500,000 sheep and goats, old stock, and 1,200,000 cattle and horses on the national forests. These forests, occupying mountains, as they do, cover a very large portion of the summer range in the western country. Those of you who are familiar with the West know that the amount of stock that can be run in much of this western country is largely determined by the amount of summer range; that is, there is more winter range than there is summer range. Consequently, while stock can be run on the lowlands and deserts during the winter when there is snow on the ground, or in the period of rains, when the desert country dries up the stock has got to go up into the mountains, and accordingly it is the condition of summer range in the mountains that largely fixes the amount of stock that can be run all through the year on the other lands. That gives the Forest Service great responsibility as to the grazing industry of the West, especially because while in some localities feed is grown on cultivated lands for winter use, the growing of feed for summer use has not yet developed to any great extent in the West. Therefore, a large portion of the stock of all this country is grazed upon the national forests in the summer.

We realize very fully our responsibility in this matter, and we are doing our level best to see that the grazing capacity of these ranges is increased. It was the fact in almost all these national forests, when the lands came under Government control, that unregulated grazing had very badly run the range down, sheepmen and cattlemen were fighting each other all through the West for possession of the range, the sheepmen were quarreling among themselves in the competition for grass, and the result was that as much forage was tramped out often as was fed. Under the regulations in force upon the national forests that sort of thing is no longer true. We are finding that regulation is not only doing away with the old evils, but is increasing very much the proceeds the stockmen get out of the range. In other words, while we have only begun to increase the number of stock on the national forests in a few places, as I read to you, we are very considerably increasing the weight of the stock which comes off these ranges. This is the essential thing. Lambs that have come from the national forests for several years past have frequently brought the highest market price in competition with lambs raised on adjoining ranges outside the national forests. The difference that it makes in the value of the range whether it is regulated or not is enormous. Take, for example, the Uinta National Forest in Utah. When we took charge of it it was very bad. There were 450,000 head of sheep. We said we would have to cut that down 90,000, and notified the sheep men that we would have to cut that down the next year and also the following year. The regulation has done away with that, and after having made the first cut we are probably not going to have to cut it down any more at all, but within a few years will be able to increase the number again. So I say that the amount of stock that will be carried by these western forests will be very largely increased, and with the increase in the summer range the total amount of stock in the country will largely increase.

Mr. HAWLEY. Do you have very much trouble in settling range wars between cattlemen and sheepmen?

Mr. PINCHOT. We have not had a killing since we took charge. There are a number of places where there are dead lines, and have been dead lines for years. You are very familiar with them, Mr. Hawley, I guess, Crook County wars, and all that, and I have heard of one place where a few sheep were killed in one forest. No man has been killed since we have had charge of it, and the range wars are at an end so far as the national forests are concerned. There used to be several dead lines in Colorado, Mr. Cook, as you know, but that matter is being disposed of, and we are working very successfully with the stockmen themselves. We have adopted this plan, which works out very well, indeed; we are asking the stockmen in each region to form an association, then to appoint an advisory board, and with that board we cooperate, and all questions relating to that particular region are referred to that board; our supervisor consults with them as to the distribution of stock, and how much stock should be run on the range, and so on. We have had very great success with that sort of thing. The American Live Stock Association has been meeting in Denver, and I had the word from them this morning that they had passed very complimentary resolutions as to the work of the Forest Service in relation to stock management.

The CHAIRMAN. Suppose you describe in a few words the plan you use in drawing the boundary lines between different herds of stock?

Mr. PINCHOT. There is a very different plan necessary as between cattle and sheep. Sheep are herded and cattle are not. Therefore sheep can be confined to a definite region, whereas cattle can only be confined to a definite region by fencing or by country that they can not cross or by their habit of going to a particular place. Therefore we can say with certainty to a sheepman, "This is your region; you go here and you go nowhere else," and we can give a sheepman an individual range. It is very difficult to give a cowman an individual range, and it is impossible if he is a small cowman, because the cattle will scatter around with other men's stock, and you can not herd cattle to any advantage, as a rule. Consequently in cattle permits we will give all the men in a certain region a permit to run in a certain country, and they will very likely have a cooperative round-up; while with sheepmen, as a rule, we can give them individual ranges and prevent their trying to run over each other, get ahead of each other, and beat each other to a particular part of the range.

The CHAIRMAN. Go one step further, and describe what happens in case of a dispute as to where the boundary line shall be, for instance, between the sheep men and the cattlemen; how do you settle that?

Mr. PINCHOT. What we do, constantly, is to hold a meeting between the cattlemen and the sheep men; send a representative of the branch of grazing from the Forest Service to meet with them; get them to thrash the thing out together if they can, and if not, the representative of the Service will talk it over with them and, with both parties present, the whole thing will be gone over and an agreement will be reached on the spot, so that both parties will know what has been done, and why. In that way we have been successful in settling all disputes.

Mr. HAWLEY. There used to be considerable complaint on the part of small owners that the large sheep owners ate them out; that is brought their herds in and ate all the range around him.

Mr. PINCHOT. We protect them by giving a preference in the allotment of range.

Mr. HAWLEY. You let such an owner have the range next to him?

Mr. PINCHOT. Let him have the range next to him and in allotting the range we say that the first man to get consideration is the small man who lives on the ground; the second is the small man who lives at a distance; the third is the big man, and the fourth is the transient. Priority in the use of the range and the ownership of improved ranch property either within or in the vicinity of the national forests is always taken into consideration. Everybody's demands have to be satisfied before we let the transient in at all; all the little men who depend upon the use of the range for the support of their families have got to be taken care of before the big men can come in, and if it is necessary to cut down the large herds in order to let the nearby small owners in, we cut them down; we adopt what we call a settlers' protective limit, which varies in different places, and we say that we will cut no small owner down below a limit of that kind; that is, what is necessary for him to support his family on; and we will let all little men in up to that amount so long as this can be done without reducing anyone below the protective limit.

The CHAIRMAN. How do you protect the little man in the range; how do you prevent the herds of the big companies from trespassing?

Mr. PINCHOT. We simply say to them, "You must not go there," and they do not do it. We say to the sheep man, "This is your range." The cattlemen make very little trouble of that kind, because the cattle use a certain range jointly and the small men's cattle mix with the big men's, and there is very little trouble. But there has been the habit among the sheep men to graze right around the settler's fence, eating up everything he had. Now we tell him, "This is not your range here, near this small man; your range is on the mountains; stay there."

Mr. HAWLEY. They would drive out the settler in order to leave the range open?

Mr. PINCHOT. Yes. We have known case after case where a man would come and put his sheep right inside of the settler's fence, in his alfalfa field, in the old days, and I have had the complaint made to me, as mentioned by Mr. Hawley, that So-and-so had run his sheep in and he had no food for his milk stock.

Mr. POLLARD. What do you do to remedy such a condition?

Mr. PINCHOT. We have one of two things: We could put him off the range—which we very seldom have to do—and make him pay damages, or we tell him, "You can not come back next year." I have right here the number of cases of trespass which we have had during the past year, with the number of lawsuits which have been necessary. We have found it possible to settle nearly every trespass case without going into the courts by agreements between the stockman and the Forest Service. There was very little trespass. The

only thing was to make it understood that we meant business, and it was the same way with the timbermen.

We are making a charge for grazing. This charge varies according to the number of months and the quality of the range. The average charge for cattle varies from 21 cents to 39 cents; for horses from 29 cents to 50 cents.

Mr. POLLARD. That is for the season?

Mr. PINCHOT. The average charges for cattle are 21 cents for five months' season or less, or 39 cents for the entire year; and for horses, 29 cents for the short season and 50 cents for the entire year. For sheep and goats the charge is, respectively, 7 and 15 cents.

The CHAIRMAN. Is not that a very cheap charge?

Mr. PINCHOT. It is an extremely cheap charge. It is from a half to a fifth of the charge ordinarily made on private lands. I have a number of cases here of actual charges made in various States through the West which shows that our charge is comparatively very small.

The CHAIRMAN. Does the difference in your charge depend upon the difference in the range or the difference in the length of time for which the range is used?

Mr. PINCHOT. Both. We have given a great deal of attention to adjusting the charge in the different parts of the West so that it would be fair.

Mr. POLLARD. Do you not think you have gotten on most too low a basis?

Mr. COOK. Too low a basis?

Mr. POLLARD. Yes.

Mr. PINCHOT. Well, these stockmen have not been in the habit of paying any charge, and it ought to begin very reasonably. In addition to that, most of the stockmen are simply men who are establishing their homes, and I do not think we ought to make a large charge.

Mr. COOK. I would like to ask Mr. Pinchot a question. This is for my own information, Mr. Chairman. Has Congress passed a law authorizing you to make a charge for grazing upon public lands?

Mr. PINCHOT. That is the opinion of the Attorney-General.

Mr. COOK. I am asking merely for information.

Mr. PINCHOT. The law did not apply specifically to grazing, but forestry in general, and the Attorney-General, on being asked, said that authorized a charge for grazing, which we accordingly went ahead and made.

The CHAIRMAN. Can you put your hands on the section which is thus interpreted, so that we can have the law in the record right alongside of the question?

Mr. PINCHOT. The law is cited in the opinion by Attorney-General Moody which governs on that question. The opinion in full is as follows:

(25, Opinions Attorney-General, 470.)

DEPARTMENT OF JUSTICE,
Washington, D. C., May 31, 1905.

The SECRETARY OF AGRICULTURE.

SIR: I have received your letter of the 29th ultimo, stating that application has been made to you for a permit to occupy a certain tract of land situated within the Alexander

Archipelago Forest Reserve, at Grace Harbor, Dall Island, Alaska, for the purpose of conducting a fish saltery, oil, and fertilizer plant, which has already been built there and is of great importance to the locality.

You say, further, that—

"It is unquestionably best for forest-reserve interests, if it can be done, that leases or permits should at times be granted for a term of years, and also that, when the privilege granted is of actual money value to the permittee, a reasonable compensation should be required from him. I receive many applications of this nature in which the applicant expresses himself as willing to pay a reasonable rental."

You therefore request my opinion upon questions stated by you as follows:

1. Have I, as secretary in charge of forest reserves, legal authority to grant a permit or lease under act of June 4, 1897, for the "use and occupation" of forest-reserve land for the purpose set forth above?

2. Have I legal authority to grant this permit or lease for a period longer than one year?•

3. Have I legal authority to require a reasonable compensation or rental for such permit or lease within the forest reserve?

The act of Congress approved June 4, 1897 (30 Stat., 34), concerning the forest reservations, authorizes you to—

Make such rules and regulations, and establish such service as will insure the objects of such reservations, namely, *to regulate their occupancy and use*, and to preserve the forests thereon from destruction.

This act also provides that—

"For the purpose of preserving the living and growing timber, and promoting the younger growth on forest reservations, the Secretary of the Interior, under such rules and regulations as he shall prescribe, may cause to be designated and appraised so much of the dead, matured, or large growth of trees found upon such forest reservations as may be compatible with the utilization of the forests thereon, and may sell the same for not less than the appraised value in such quantities to each purchaser as he shall prescribe."

The act of Congress approved February 1, 1905, transferring to your Department jurisdiction over forest reserves, provides:

"SECTION 5. That all money received from the sale of any products *or the use of any land* or resources of said forest reserves shall be covered into the Treasury of the United States and for a period of five years from the passage of this act shall constitute a special fund available until expended, as the Secretary of Agriculture may direct, for the protection, administration, improvement, and extension of Federal forest reserves."

It appears that while no charge as such has been made on account of the granting of the privilege of using and occupying forest reservations, the permittees have been required, as a condition to the issuance of permits, to agree "to assist forest officers in the execution of their duties by furnishing information and actual help in cases of emergency," and "to do all in their power to prevent forest fires and to assist in fighting the same without waiting to be called on to do so by the proper officer," which service on the part of the persons securing permits is said to have been rendered unhesitatingly for years, without objection on the part of Congress or anyone else.

"In *Decatur v. Paulding* (14 Pet., 497) it was held that, in general, the official duties of the head of one of the Executive Departments, whether imposed by act of Congress or by resolution, are not mere ministerial duties. The head of an Execu-

tive Department of the Government in the administration of the various and important concerns of his office is continually required to exercise judgment and discretion. He must exercise his judgment in expounding the laws and resolutions of Congress under which he is from time to time required to act." (*Riverside Oil Company v. Hitchcock*, 190 U. S., 316, 324.)

Obviously any action you may take under the authority conferred by the act of 1897, above quoted, is not merely formal or ministerial in its nature. The jurisdiction which Congress has intrusted to you is essentially discretionary. It would therefore seem that when, in the exercise of that discretion, you determine that the granting of a permit to use and occupy a reservation for a specified purpose is consistent, according to your judgment, with insuring the objects for which the reservation was created, then your decision in the premises is definitive and subject to review in no other way than by the Congress from which your power to act was derived. Answering your first question, therefore, I have to advise you that, in my opinion, you possess authority to grant a permit for such a purpose as that set forth in the application referred to by you.

The legislation expressly referring to forest reservations is silent with reference to the period for which the permits may be granted, and my attention has not been called to any other statutory provision which can be said to limit your action in this connection.

In granting the permits you are to "insure the objects of such reservations" in accordance with the language of the statute, and since in some instances the fixing of a term of years as the period of duration may be "best for the forest reserve interests," I am of the opinion that in such cases you are authorized to grant the privilege for a longer term than one year, and consequently answer your second question in the affirmative. Most assuredly, however, as has been suggested, the permits should not be given for a longer period than, under the circumstances of each case, would seem reasonable. They should also be limited to terminate whenever the reservation for any reason ceases to exist, and upon breach of any of the conditions under which the privilege is granted.

Under the act of 1897 you are simply directed so to regulate the occupancy and use of these reservations as to insure the objects thereof and preserve the forests thereon from destruction. The act contains nothing inconsistent with the making of a reasonable charge on account of the use of the reserves under the permit granted by you. By the act of 1905 you are to cover into the Treasury money received from the "use of any land or resources" of the reservations, which "shall constitute a special fund * * * for the protection, administration, improvement, and extension of the Federal forest reserves." Any sums of money realized in this connection would thus tend to preserve the forests and insure the objects of the reservations, and it might therefore be contended that Congress, in authorizing you to regulate their use and occupation, considered the incidental question of charging for their use a proper subject to be left for your judgment and discretion. That such was the Congressional intent finds support in the fact that services somewhat analogous to compensation have been required for several years, without any indication of a disapproval thereof on the part of Congress.

Furthermore, your power to prohibit absolutely the use or occupation of any forest reserve, when such action is deemed by you essential to insure its objects and preserve the forests from destruction, would probably be unquestionable, and that the authority to prohibit carries with it the right to attach conditions to a permission is well established. (22 Opins., 13, 27.)

In answer to your third question, therefore, I have to advise you that, in my opinion, you are authorized to make a reasonable charge in connection with the use and occupation of these forest reserves whenever, in your judgment, such a course seems consistent with insuring the objects of the reservation and the protection of the forests thereon from destruction.

Respectfully,

W. H. MOODY,
Attorney-General.

Mr. McLAUGHLIN. That seems to favor the small holder to the actual settler. In making these charges do you make any difference between the settler and the large stockholder?

Mr. PINCHOT. We charge the small men and the large men the same price, but give the small men the preference in the use of the range adjacent to their homes, which is of special value to them.

Mr. McLAUGHLIN. Sometimes that would cover the entire herd of a small man?

Mr. PINCHOT. Very many times. I would like to put this in the record: We have about 18,000 permits for cattle and about 4,000 permits for sheep and goats. Of the 18,000 permits for cattle 11,661 are for less than for 40 head.

Mr. McLAUGHLIN. What is the size which would permit to graze without charge?

Mr. PINCHOT. Ten head.

Mr. HAWLEY. Why do you charge more for horses than for cattle; because they destroy the range?

Mr. PINCHOT. Yes, and because they eat more.

Mr. HAWLEY. Do they harm the range more than cattle?

Mr. PINCHOT. Yes. You see they have teeth above and below and feed the range much closer; also they travel more and consequently destroy more feed by trampling.

Mr. POLLARD. It seems that it is hardly fair to the Government or to other stockmen for the Department to make such a low charge. You take a man who is in the cattle business or the sheep business who has his own range. He has to pay for his land. He has the same expense in taking care of that the range man has in the forest reserve. He has taxes to pay, and all that, which the range man on the forest reserve is exempt from. Now, then, if you let him have the use of that land for almost nothing, it seems to me it is an undue advantage.

Mr. PINCHOT. One of the answers to that is that these men came into the country with the idea that the range would be free to them; that it was free to their predecessors. Their business was calculated on the basis of either a small charge or no charge at all, and in addition to that the vast majority of them have to maintain outside of the national forests some kind of an outfit to handle their stock while they are not in the mountains. It seems to me that a small charge is the fair thing.

The CHAIRMAN. Do you collect this charge in advance?

Mr. PINCHOT. Yes.

Mr. COOK. I would like to ask Mr. Pollard a question, Mr. Chairman. Mr. Pollard, I will ask you, taking your State of Nebraska thirty years ago, whether or not there would be a single farmer or stock raiser in your State at that time who would not have objected to any charge on the part of the Government for grazing his stock?

Mr. POLLARD. That is possibly true.

Mr. COOK. You have not very much public land left now, except in the extreme western portion of your State?

Mr. POLLARD. Very little. But my idea was this. Of course I may be laboring under a wrong impression, it is just simply my own idea, I may be wrong, of course; but, as I understand the situation, the cattlemen and the sheep men out in that country are depending wholly upon the Government range to carry on their business. Practically all the feed that their cattle get comes from the public domain.

Mr. HAWLEY. That is only in the summer; they send off and feed in the winter.

Mr. POLLARD. Feed them grain?

Mr. HAWLEY. Yes.

Mr. POLLARD. In my country if the ranchman wants to get range for his cattle he has to pay a dollar a month a head to get them cared for in the summer, and he has to feed them grain besides to get them ready for the market. When he has to compete with men out in that country he is up against a hard proposition.

Mr. HAWLEY. It is the same proposition regarding rent. You pay more rent here in Washington than you do at home because there is greater demand.

Mr. POLLARD. Of course I do. Of course I do not mean to say that the Government can charge a dollar a month for a head, but it does seem to me that 29 cents for a year's grazing is very small.

Mr. PINCHOT. These are averages.

The CHAIRMAN. What do you mean by that; you have a higher charge?

Mr. POLLARD. I understood you to say that 29 cents was the maximum.

Mr. PINCHOT. No; that is the average maximum.

Mr. POLLARD. Then you do charge more than that?

Mr. PINCHOT. Fifty cents is the highest for cattle.

Mr. POLLARD. That is for the year?

Mr. PINCHOT. For the year.

Mr. POLLARD. For twelve months' grazing?

Mr. PINCHOT. Yes.

Mr. HAWLEY. In answer to the remarks of Mr. Pollard, I would say that there are more losses on the range. That is, the range man running on the public range is liable to more losses than the man who has a more settled community in which to run his cattle and horses.

Mr. POLLARD. On what ground, wild animals?

Mr. COOK. So many blizzards and storms.

Mr. PINCHOT. Sixty cents is the maximum, I find.

Mr. McLAUGHLIN. How long has the Government been making a charge?

Mr. PINCHOT. Two seasons.

Mr. McLAUGHLIN. Have the rangers been taking more kindly to it than formerly.

Mr. PINCHOT. There is very little opposition left. There is a little in your State, Mr. Cook.

Mr. COOK. There is a great deal in my State.

Mr. PINCHOT. I was delighted to receive this, Mr. Cook. I got a letter just recently which shows a remarkable change of feeling in favor of national forests in northwestern Colorado, where most

of the opposition in your State has centered. In other words, the opposition, which was a very violent one, as you know, in the western part of Colorado, is breaking up, and the men are finding that they are getting more out of their stock business with our fee than they are without it.

Mr. COOK. That is so, Mr. Pinchot, as to our large cattle and sheep men, men who control and are members of those associations; but it is our small members with 40 or 50 head of stock and our small stockmen, you might say, who are just starting, who object to the charges which my friend, Mr. Pollard, thinks are entirely too low. I believe you know the sentiment of the people out there pretty well, and I think that you are pretty well liked in our State. I do not think you are always quite correct in some of your administrative affairs, and I hope you will not get yourself disliked among our people by advocating the plan of my friend from Nebraska.

Mr. PINCHOT. Mr. Cook, you remember I went on record at Denver in June that we would not raise that fee during President Roosevelt's Administration.

Mr. POLLARD. I understood Mr. Pinchot to say some little time ago that the cattle were shipped from the range. I supposed he meant grass-fed cattle were topping the market in Chicago.

Mr. PINCHOT. No, lambs; I do not believe the cattle are.

Mr. HAWLEY. No; they come down the mountains right after the winter feed to fatten.

Mr. PINCHOT. The rich feed on the high mountains is the thing that fattens sheep, as Mr. Cook knows, better than anything else, and, as a rule, the lambs from this country for several years past have sold as high, or higher, than any others, and generally the forest-reserve lambs have been better than lambs from the outside range.

Mr. COOK. Mr. Pollard, the lambs in our State do not run at large at all. The lambs are shipped from New Mexico to Colorado, and never leave the pen in which they are shipped to the Chicago, Omaha, Kansas City, or St. Joe markets. They are fattened on alfalfa or beet, or something of that kind, and to top them off we buy our corn down in your State and in Mr. Scott's State.

Mr. LEVER. Mr. Chairman, in order to relieve the feeling of Mr. Cook, I will state to him that under the coming Bryan administration we intend to take off these fees altogether.

The CHAIRMAN. I suggest, in the interest of expediting this hearing, that discussion among the members of the committee as to any given policy had, perhaps, better be deferred until we come to the debate upon the bill itself, because we are now using Mr. Pinchot's valuable time and we have requested him to be careful himself.

Mr. COOK. I want to say that mine is pretty valuable, too, at present.

The CHAIRMAN. The time of all of us is valuable.

Mr. POLLARD. I want to ask Mr. Pinchot one more question. I do not care to raise a question or any controversy, but I would like to have Mr. Pinchot give us the information and let it go in the record—the amount of money you received from these fees which you have gotten.

The CHAIRMAN. In that connection, why not put the whole statement, Mr. Pinchot, of the cost? If you are not prepared to do it right now, insert it at this place when you get the copy—the cost of

administering the Forest Service and the income from all sources, and that will cover the whole thing.

Mr. PINCHOT. I will answer Mr. Pollard's question briefly by saying that grazing fees a year ago this last summer were \$514,000 and this last summer \$863,000.

Mr. POLLARD. That is the grazing fees?

Mr. PINCHOT. The grazing fees; yes.

Mr. POLLARD. That is for all kinds?

Mr. PINCHOT. For all kinds.

Mr. McLAUGHLIN. Is there any considerable expense to the Government in looking after those grazing matters after you give the privilege?

Mr. PINCHOT. Yes; it is absolutely necessary to keep a certain number of men on the ground to see that the regulations are followed.

The following is a summary of receipts from the national forests in the United States for the fiscal year, July 1, 1906, to June 30, 1907:

| | |
|-------------------------|-----------------|
| Timber sales..... | \$602, 565. 42 |
| Timber settlements..... | 17, 811. 25 |
| Timber trespass..... | 66, 436. 45 |
| Grazing..... | 863, 920. 32 |
| Special uses..... | 20, 326. 00 |
| Total..... | 1, 571, 059. 44 |
| Refunds..... | 40, 737. 56 |
| Net total..... | 1, 530, 321. 88 |

I should like in this connection to submit also this statement of expenditures and receipts from the fiscal year 1899. You will see by this statement that the net cost of the national forests to the Government declined from \$436,000 in the fiscal year 1905 to \$190,000 in 1906, and that last year this cost was converted into a small surplus over expenses.]

Statement of expenditures on account of forestry investigations, and expenditures and receipts on national forests.

[Expenditures for 1908 based on allotments; receipts estimated.]

| Fiscal year. | Appropriation (includes amounts expended from receipts fund 1900-1908). | Distribution of expenditures. | | | | Receipts from sale of timber, grazing, etc. upon national forests. | Difference between receipts and expenditures upon national forests. | Total area of national forests. | Average expenditure per acre. | Average receipts per acre. | Ten per cent net receipts paid to States. |
|--------------|--|-------------------------------|------------------------------------|-----------------------------|-------------------------------------|--|---|---------------------------------|-------------------------------|----------------------------|---|
| | | Forestry investigations. | Investigation on national forests. | Permanent improvement work. | Administration of national forests. | | | | | | |
| | Division of Forestry (Bureau of Forestry, Land Office, Forest Service), Department of Agriculture. | | | | | | | <i>Acres.</i> | | | |
| 1899..... | \$28,520.00 | \$175,000.00 | \$28,520.00 | | \$175,000.00 | \$7,534.83 (Net cost.) \$167,465.17 | 46,168,439 | \$0.0038 | \$0.00016 | | |
| 1900..... | 48,520.00 | 210,000.00 | 48,520.00 | | 210,000.00 | 36,754.02 (Net cost.) 173,245.98 | 46,515,089 | .0045 | .00078 | | |
| 1901..... | 88,520.00 | 325,000.00 | 88,520.00 | | 325,000.00 | 29,250.88 (Net cost.) 265,749.12 | 46,324,479 | .0070 | .00063 | | |
| 1902..... | 185,440.00 | 300,000.00 | 172,182.17 | \$13,257.83 | 300,000.00 | 25,431.87 (Net cost.) 287,826.96 | 51,896,357 | .0060 | .00049 | | |
| 1903..... | 291,860.00 | 304,135.00 | 262,556.42 | 29,263.58 | 304,135.00 | 45,838.08 (Net cost.) 287,590.50 | 62,211,240 | .0054 | .00074 | | |
| 1904..... | 350,000.00 | 375,000.00 | 272,809.19 | 77,190.81 | 375,000.00 | 58,436.19 (Net cost.) 393,752.62 | 62,611,449 | .0072 | .00093 | | |
| 1905..... | a 632,232.36 | a217,907.64 | 340,935.32 | 84,186.68 | 425,000.00 | 73,270.15 (Net cost.) 435,910.53 | 85,693,422 | .0059 | .00085 | | |
| 1906..... | 1,191,400.21 | | 234,400.54 | | 956,999.67 | 767,219.96 (Net cost.) 189,779.71 | 106,994,018 | .0089 | .00717 | \$75,510.18 | |
| 1907..... | 1,800,595.20 | | 282,175.89 | | 1,465,320.10 | 1,571,059.44 (Surplus.) 115,730.34 | 150,832,665 | .0096 | .01041 | 153,032.19 | |
| 1908..... | b3,405,655.88 | | 306,907.32 | | 2,454,952.75 | 2,000,000.00 | | | | 20,000.00 | |

^a Administration of National Forests transferred to Forest Service February 1, 1905.^b Includes \$300,000 appropriated for permanent improvement.

Mr. McLAUGHLIN. Do you keep track of that expense, so that you will know the net receipts from grazing?

Mr. PINCHOT. I do not think that could be reached, because these men do not only grazing work, but other work; that is, for the past. We are making an attempt, beginning with the 1st of January, to have this divided up, so that next year I may be able to answer this question.

Mr. COOK. Eight hundred and sixty-two thousand dollars you say were the total receipts for last year?

Mr. PINCHOT. Eight hundred and sixty-three thousand dollars from grazing.

Mr. COOK. 1907?

Mr. PINCHOT. Yes, 1907; and from timber sales at the same time \$603,000.

Mr. POLLARD. Mr. Chairman, I would like to ask a question a little further along that same line, with Mr. Cook's permission.

Mr. PINCHOT. Is this grazing or cost?

Mr. POLLARD. Grazing. My question is this: Are the ranchmen who are grazing their stock on the public domain or in the national reserves prosperous; are they making good money, would you say?

Mr. PINCHOT. The sheep men have been making very big money for three years.

Mr. POLLARD. With their grazing on the United States reserves?

Mr. PINCHOT. Yes; the sheep business has been extremely prosperous; the cattle business has been less prosperous.

Mr. POLLARD. Less prosperous?

Mr. PINCHOT. Yes.

Mr. POLLARD. But they have been making fairly good profits?

Mr. PINCHOT. During the last few years there was a time when they were in a pretty hard way.

Mr. POLLARD. Two years ago?

Mr. PINCHOT. Yes.

Mr. POLLARD. They are making more money now in paying this fee than they did before?

Mr. PINCHOT. I think they are.

Mr. HAWLEY. That is hardly a fair statement of the case, because there has been an unusual market. We sold sheep out there in Oregon for \$5 after they were sheared.

Mr. POLLARD. We are speaking of cattle.

Mr. HAWLEY. I thought you were speaking of sheep. There has been a good market, entirely independent of what you may have paid on the range. The question has a direct bearing upon an already large industry.

Mr. POLLARD. I simply wanted to get that information.

Mr. COOK. Mr. Chairman, I want to say that I agree with Mr. Pinchot so far as the sheep business is concerned; that is true. But I say to you, Mr. Chairman and gentlemen, that this season and this winter have been the worst on the cattlemen of Colorado and all over the West since 1893.

Mr. McLAUGHLIN. Why is that so?

Mr. COOK. Because the markets are bringing \$2 and \$2.25 for grass-fed steers. We have no means in those Western States of fattening our cattle as you men in Nebraska and Kansas. Therefore you get \$5 to-day in Chicago for your corn-fed steers against our \$2 for our grass fed in Colorado or Washington or Oregon. And I say, gentle-

men, without the least reservation, that this last year has been very hard on the cattlemen of the West; and for several years, as you know, Mr. Pinchot, our stock men have been doing very well, but not so under the present conditions of the market.

The CHAIRMAN. It is a market condition and not a question particularly of policy of the administration of the public domain.

Mr. COOK. Yes; I should say it is, because the more you tax the stock growers the less money they have. Mr. Pollard's question was a proper one to Mr. Pinchot, as to whether or not these men were doing well, making money. I say the sheep men have made money, but the cattlemen have been very hard pressed for the past year—that is, 1907—and the same conditions exist now.

Mr. PINCHOT. My information, Mr. Cook, was not exactly like yours. I had an idea that this fall started in a great deal better than last year, but when the panic came it was very bad. I know that when the panic came it was bad, but I understood that before that it was better than last year and the year before.

Mr. COOK. To show that the conditions of the country affect other branches—I am leading up to the point. We are interested in the mining industry in this country. So far as the production of silver and lead and copper and zinc is concerned, it never was so bad, not even in 1893, and our big silver mines are shut down in Colorado, and that thing directly affects your Bureau, Mr. Pinchot, because we have to pay for every stick of timber we use in our mines now to Mr. Pinchot indirectly or his Bureau.

Mr. LAMB. You would have to pay for that anyway.

Mr. COOK. If the mines are closed, we would not use the timber. Take the city of Leadville. It needs forty or fifty cars of timber a day to make the roofs and fittings for the mines. I venture to say that there are not five cars a day going into that town. These conditions—I know this committee is not responsible for them—have brought about this situation that has affected the cattle market all over the West, in your State, Mr. Pollard, as well as others.

Mr. PINCHOT. The next question is the total supply of timber in this country and the relation that wood has to the method in which the national forests ought to be handled, one of the most important problems the Forest Service has to deal with. Through the branch of products and in cooperation with the Bureau of the Census we think we have made what is the best enumeration ever made of the total product of timber in the United States. We got the results last fall, and we find that there are about 50,000,000,000 feet of mill product and 50,000,000,000 feet of other product, so that the total drain on our forests is about 100,000,000,000 feet a year. Then for the supply we have figured as carefully as we could from the existing estimates and have taken the large estimates rather than the small ones, so as to make this thing absolutely conservative, and we believe that the total stand of timber in the country lies somewhere between fourteen hundred and two thousand billion feet of timber. If we take the largest estimate of two thousand billion, and the largest reasonable estimate of growth, which is forty billion, we get in the neighborhood of twenty-five to thirty years for the complete exhaustion of our timber if the consumption goes on at the present rate.

Now, the consumption has been growing with enormous rapidity. Our consumption has grown twice as fast as our population, which

is saying a good deal. In twenty years our population grew 50 per cent, and the consumption grew 94 per cent. The effect of it has been very plainly shown in prices. I have figures here to show, for instance, that in nine years the stumpage price of white pine, for example, has increased from three dollars and something to eight dollars and something, and a similar, though smaller, increase has taken place in the stumpage price of other kinds of timber. In other words, since about 1900 the rise of stumpage prices has been so rapid as to make it perfectly clear that we have already entered the period of this timber famine. Everybody through the country, and especially through the West, as Mr. Cook and Mr. Hawley know, has been complaining of the exceptionally high prices of timber, and that has gone on in the East somewhat.

Mr. HAWLEY. Is that not largely due in the West to the car famine? You can not get cars, and because of the scarcity of cars to move the timber the price is high. Is it not due, to some extent, to that?

Mr. PINCHOT. No; because the cars would take what timber they have away. It was the Mississippi Valley that suffered from the car famine much more than your people.

Mr. HAWLEY. We have mill after mill in the Willamette Valley and not half of them are running to their capacity.

Mr. PINCHOT. There is the same effect from that everywhere; the prices have increased in the East. It has been a general movement.

Mr. HAWLEY. That would be the general result if the timber could not be shipped. The smaller quantity would demand a higher price.

Mr. PINCHOT. It has been felt in both places, but the fundamental reason for it all is that the timber is getting scarce. Any essential commodity that is transported responds very quickly to the total amount available, and we are in a position where the total amount of timber in the country is going to fall far below the country's needs. We use more timber per capita, a great deal more, four or five times as much, as they do in Europe. We have been brought up to use timber, and there is no other country for which a scarcity of timber is so severe a calamity as it is for us. I did not realize the true condition of affairs until the last six months, for the statistics were not entirely available, but now that we have got the facts the condition shown is a very serious one indeed. We have only about one-fifth of the timber land in the national forest; four-fifths is in private hands, and this is one of the reasons, Mr. Pollard, why we have to spread information about forest preservation throughout the country.

Mr. POLLARD. I was not controverting any facts, but simply seeking the causes.

Mr. PINCHOT. I am not replying in that way, either. I just want to connect up the two things. We have reached this point, now, where we have got to do something pretty vigorous or we are going to be dreadfully pinched—we are going to be pinched anyway. There are only two things that the Government can do. One of them is to spread information about forestry as widely as possible, get private owners interested, and get them to save their own forests, and the other is to take care of the forest lands on the national forests themselves. Now, when this transfer of the national forests to the Department of Agriculture was made three years ago I agreed with the committee that if they would make that transfer I would

make the national forests self-supporting in five years. We have done it in a little less. The forests are self-supporting and a little more this year, which is two years and a half from the transfer. Now, I want to propose to you a change in policy, based on this statement that I have just made, of the extreme scarcity of timber compared with our needs.

Mr. POLLARD. Before taking that up, I would like to ask this question: To what extent have the private owners of forest lands adopted the methods that you have set forth in the pamphlets you have been sending out?

Mr. PINCHOT. To the extent of a considerable number of million acres.

Mr. POLLARD. What part of the country does that relate to chiefly?

Mr. PINCHOT. Practically all through the country.

Mr. POLLARD. May I ask to what extent the people in this Appalachian section are adopting your methods?

Mr. PINCHOT. Some of them are; some of the companies there are adopting our methods, but not enough to make any material difference. Even suppose we have five or six million acres in the whole country that are being operated with a more or less exact conformance to the advice that we have given. It is a little bit of a thing; it is a drop in the bucket. It amounts to nothing. The total timber area of the country is well over six hundred million acres.

Mr. POLLARD. May I ask this question? You get the help of the papers to disseminate this information as far as possible to those sections where they have the national forests in the hands of private parties?

Mr. PINCHOT. Exactly that.

Mr. POLLARD. You press it along that line?

Mr. PINCHOT. We do, and we do more than that; we send men out, because we find that much more effective. We publish an offer of cooperation, offering to help anybody who needs it, and tell them, sending men to the ground to tell them, how to handle this timber land.

Mr. POLLARD. You send an expert there?

Mr. PINCHOT. We send an expert there.

Mr. POLLARD. To what extent have they been calling on you?

Mr. PINCHOT. More than we could supply. Since the national forests have come over here the Service has felt it its duty to give most of its attention to the Government lands, but we have not given up the other work and have attended to it as far as we could.

Mr. POLLARD. They are responding very generally?

Mr. PINCHOT. They are responding very considerably, although it is a drop in the bucket as yet.

Mr. POLLARD. How long has it been since you adopted this method?

Mr. PINCHOT. We began it in 1898.

Mr. POLLARD. Ten years, then?

Mr. PINCHOT. Yes. We have reached a point where all the lumber papers and all the lumber people—and they control the whole thing, control the vast bulk of the forests of the country—are willing to give us a respectful hearing and, at the same time, quit pooh-poohing our methods, and a great many of the companies are beginning to adopt our methods.

Mr. POLLARD. If this committee or Congress should give you an increase in the appropriation for this purpose, and you could carry out the plan you have already adopted, and which is now under way, do you think that it would solve this question, and that in a reasonable length of time you could be in a position so that you could have these methods introduced pretty generally through the section where the timber is in the hands of private owners?

Mr. PINCHOT. Yes; I do think so. I think there are two things necessary. One is what you have already spoken of; the other is the training of expert foresters in this country. The crop of expert foresters is only between thirty and forty a year.

Mr. POLLARD. Can you tell the committee about the amount of money that you expend now in the way of carrying this information to the foresters?

Mr. PINCHOT. Yes; I can give it to you generally here and in detail. The allotment for the present year is about \$29,000.

Mr. POLLARD. That includes the cost of sending these pamphlets out to the coast?

Mr. PINCHOT. No; this is the cost of the men.

Mr. POLLARD. That is aside from the publicity?

Mr. PINCHOT. Aside from the publicity, yes. The total cost of our publications has averaged lately between \$25,000 and \$30,000 a year, and a considerable percentage of that goes in this way. But, Mr. Pollard, we are under this extremely serious drawback; you can not do this work except you have trained men to do it. Forestry is a profession like any other, and you can not do engineering without engineers; you can not do forestry without foresters, to some extent at least, and we have only three or four schools in the country that are turning out trained men, and, as I have said, the total crop of trained foresters is not over forty. We got this last spring, I think, twenty-nine new men.

Mr. POLLARD. Where do you get them?

Mr. PINCHOT. The most of them come from the Yale Forest School and from the Forest School at Ann Arbor; we get one or two men from Harvard; one or two men from Biltmore, and I think Nebraska turned us out two men—the University of Nebraska.

Mr. HAWLEY. In the matter of the Appalachian Mountains, there is a proposition to take over a large portion of that land for a forest reserve; have you been making investigations in that section?

Mr. PINCHOT. Yes.

Mr. HAWLEY. Have you had a forester down there advising those people to preserve the young growth?

Mr. PINCHOT. We have done what we could.

Mr. HAWLEY. How have they responded.

Mr. PINCHOT. They have responded somewhat.

Mr. HAWLEY. What do they do with the lands they have cut over; do they burn the debris?

Mr. PINCHOT. They let the fires run. We have done the best we could with those people, but our resources are small, and the amount of forest land in the country is huge, and we have been obliged simply to do what little we could. It has been scratching the surface, really. But I do not want to seem to exaggerate, and I am not saying anything that I do not thoroughly believe, but with this timber famine coming on the means that we have been able to employ to counteract

it, outside of the national forests, have seemed to me to be absolutely impotent as compared with the effort that was ahead of us.

Mr. LEVER. Mr. Pinchot, in order to understand exactly your position in this matter, let me ask you this, with reference to the Appalachian Mountains: It is not your opinion, as I take it, that any increase in this appropriation here would give you the power to prevent the enormous destruction of those forests in those mountain ranges?

Mr. PINCHOT. No; we can do something, though.

Mr. LEVER. It would be a very little something?

Mr. PINCHOT. It would be a very little something.

Mr. LEVER. Your statement heretofore with reference to the timber famine has been more particularly to the soft-wood timber; is that true?

Mr. PINCHOT. We have now found that the decrease in hard-wood timber is more rapid than the decrease in soft wood.

Mr. LEVER. Will you please give the committee some statement as to that?

Mr. PINCHOT. Yes. The hard-wood output has decreased about 15 per cent while the soft-wood output is very largely increasing. In other words, the destruction of hard-wood timber has proceeded very much further than that of the soft-wood timber, and the situation as regards hard-wood timber is more serious than the situation as to soft-wood timber.

Mr. LEVER. In what areas of the country are the hard-wood timbers located?

Mr. PINCHOT. The only great patch of hard-wood timber lands is in the Appalachian. The hard-wood timber has been exhausted pretty much everywhere else.

Mr. BEALL. Are you acquainted with the conditions down in the yellow-pine regions in Texas?

Mr. PINCHOT. More or less.

Mr. BEALL. What is the condition down there with reference to the destruction of timber?

Mr. PINCHOT. The destruction is proceeding very rapidly all through that region. You are familiar, perhaps, with the operations of the Kirby Lumber Company. They have been cutting on a very extensive scale, and while they started out to practice forestry on the plan we fixed up for them, they have practically given it up.

Mr. BEALL. Is it practiced by other companies down there?

Mr. PINCHOT. I have a list which I think gives one name in Texas, the Houston Oil Company, whose lands are being lumbered by the Kirby Company. Those are the only Texas people I have on this list.

Mr. BEALL. Have you anything there showing the increase in the price of timber in that section?

Mr. PINCHOT. Yes; I have it in here if I can lay my hand on it. I have not the data separated for Texas.

Mr. BEALL. Is there a corresponding increase in other sections of the country?

Mr. PINCHOT. In the cut?

Mr. BEALL. In the price of this material?

Mr. PINCHOT. Yes.

Mr. BEALL. Do you think this increase of price over the country generally is largely due to the decreasing supply of lumber?

Mr. PINCHOT. I certainly do. I think it is mainly due to that. There has been a great deal of talk about its being due to the lumber trust. There may be something in it; I do not know. But the fundamental fact is that we have not got the timber in the country that we used to have, and that we are destroying it very, very rapidly.

The CHAIRMAN. You said, in answer to one of Mr. Beall's questions, that a number of companies in his section had adopted your plans, but had abandoned them.

Mr. PINCHOT. I said one company had practically abandoned them.

The CHAIRMAN. When did they abandon them?

Mr. PINCHOT. It is a very complicated story. The Houston Oil Company owned a lot of lands down there. They made a deal with the Kirby Lumber Company, the Houston Oil Company owning the land and the Kirby Company having only a right in the timber. The agreement which they were on the edge of perfecting, as I understand it, between the Houston Oil Company and the lumber company fell down because the Kirby Company would not be content except taking everything that their original contract called for.

Mr. BEALL. Practically denuding the land of timber?

Mr. PINCHOT. Yes; denuding the land of timber.

Mr. COOK. You use the word "destruction," I believe. Would not the word, if you will allow me, "consumption," by the people of this country, be better? Owing to the great prosperity they have taken this lumber for building and manufacturing purposes, but has it been absolutely necessary for the people to use this lumber and timber?

Mr. PINCHOT. Certainly.

Mr. BEALL. Has there not been a great deal of destruction with it?

Mr. PINCHOT. That is exactly the difference. Under forestry you can cut lumber out of a forest and still keep the forest growing, but the methods of forestry have not been used, with the result that the timber has been cut and used, but the forest is destroyed and estopped from producing more timber.

Gentlemen, I have just one more thing to say, and it will not take long. If I am right, as I thoroughly believe I am, about the scarcity of timber in the country and the timber famine that is coming, then I think, instead of attempting to get every cent we can out of the national forests, in order to make them self-supporting, which was the agreement I had with the committee three years ago, that we ought to change that method and say to ourselves that instead of getting all the revenue that we can we will turn around and adopt another plan. In other words, to make a revenue, to keep on and make a surplus, we will have to cut more timber from these forests than we ought to cut, considering future needs. We have not trained men enough to cut it right, and it will do harm to cut it too fast.

I do not mean that the revenue ought to stop, but I would like to consider myself free from the obligation which I put myself under with the committee, on the ground that I have already fulfilled it, and now have you direct me to do the best thing for the forests and the best thing for the country at large, instead of fixing my main attention on the revenue.

Mr. McLAUGHLIN. Do you not think this branch of your work, disseminating knowledge and securing cooperation, a very important branch?

Mr. PINCHOT. I do, indeed.

Mr. McLAUGHLIN. Is that work progressing satisfactorily? Have you any suggestions to make where you think it would be helped by further appropriations or by action of this committee?

Mr. PINCHOT. It can be helped by further appropriations, and one other thing that is absolutely essential—and I think we have got pretty near to—is a considerable gift to one of the forest schools in order to increase its capacity to turn out men. I have got to get some rich man to give a lot of money to one of the forest schools so that it can double or treble its output of foresters.

Mr. McLAUGHLIN. I speak of that cooperation with the forest men and lumbermen because I come from a State where pine timber grew in abundance, and we have slaughtered millions of it, and I know very well that it could have been cut in such a way as to save the forests to a certain extent and leave something as a start for a new one. If work could be done with these men, if we could induce them to do the cutting right, it would be very valuable work, it would seem to me. I think your work along that line should be encouraged, and that we should help you in any way we can.

Mr. PINCHOT. We have done it just so far as we have had the money and the authority.

Mr. McLAUGHLIN. Because the amount of timber lands that the Government owns and can get is comparatively small. That is a very small part of the entire timber supply of the country. We can save what we have, and within limits we can appropriate money to buy more, and we must work with the men who have timber, because they have the most of it. I would be glad if you have anything further or will have anything further to offer about how this work of cooperation should be carried on by your department, and if you have such I would be very glad to hear you indeed.

Mr. PINCHOT. I have no change in plan to suggest. I think the plan we have used has been thoroughly successful. It has been limited by the amount of money we had and the number of men we had, and because we have felt ourselves bound to take a great many of the men in that work and put them on the national forests. If you will do what I am suggesting here and allow me to put the weight on the production and preservation of the forests rather than the revenue, I can take some of the men off the national forests who are cutting timber there in the right way, and put them on this cooperation work, and I should like very much to do so.

Mr. POLLARD. Are there not a great many foresters who grow up in the forests, who have not had the college training, who may be able to be of great service to you in the cooperative work?

Mr. PINCHOT. Yes; we are using a great many of that kind of men, but you have to have somebody to direct the work who is a trained forester, just as you must have a trained engineer and bridge builder, although you may have a trained foreman. One more word in this connection. I would like, then, to have you lay particular stress on the good of the forests instead of merely on the revenue. There would be a very large revenue anyhow, but I would like to turn some men loose from the work on the national forests and put them in the cooperation work, and I should especially like if we could get a sufficient appropriation from the committee to put the national forests, as rapidly as is fair, in good shape; I should like a special appropria-

tion for that purpose. In other words, I am very anxious indeed to go ahead with the work of constructing trails and roads, cabins and pastures, telephone lines and bridges, and so on, to make these forests accessible in all directions. We have had most unusual good luck with fires. I am very proud of the record made last year. Year before last—two years ago—the area burned over was 52,000 acres. This year the total area burned over, of timbered land, is only 15,000 acres. Last year the loss was \$96,000. This year that is only \$26,000. I believe we had 1,200 fires started, but our boys have done admirable work in checking fires, and we have had a very wet season and very good luck. There is coming, and coming before long, a dry season; I do not know when. When that dry season comes, there is great danger of fires getting started; you can not fight a big forest fire after it is started. The only thing that will put that out is a change of wind or rain. Our success is getting quickly to the fire, while it is young. I want to have plenty of trails, plenty of telephone lines, plenty of means of communication around among these forests in order to make it safe.

The CHAIRMAN. You do not need those improved means of transportation for the purpose of finding a sale for more of the timber, do you?

Mr. PINCHOT. There will be a gain there distinctly, yes, in this case; I do not want ripe timber, which ought to be cut, to fall down and rot and be of no good to anybody. There will be a decided avoidance of waste in that direction. But the essential thing is that we should not lose millions, hundreds of millions, of feet of timber by fire as we used to do, and the only safeguard is this protection. A single big fire will burn up timber of more value than the money I am proposing to ask for in these improvements.

The CHAIRMAN. You spent \$500,000 during the current year.

Mr. PINCHOT. We are spending it.

The CHAIRMAN. Just for this purpose. How much do you think you could economically expend for the purpose during the next fiscal year?

Mr. PINCHOT. Two millions. I should like to ask for two millions with authority to continue that expenditure until January 1, 1909, instead of July 1, 1908, for this reason: You get pieces of work of this kind started and they necessarily run right through the summer. The break at the beginning of the fiscal year, July 1, makes us a great deal of trouble and prevents us from carrying on work straight through, this improvement work. If it were possible for you to give the Forest Service a reasonable sum for this work and allow that sum to be expended for a year and a half instead of just a year, it would be of advantage.

Mr. HAWLEY. You mean January 1, 1910, do you not?

Mr. PINCHOT. Yes; 1910. It would help us very much indeed in the business conduct of our work.

The CHAIRMAN. Two million dollars to be expended over a stretch of territory covering many hundreds of miles in the construction of trails and roads and ditches and telephone lines is a very large sum of money, and the work would necessarily require high organization and a great many overseers of large responsibility. Is your Bureau organized, do you think, in such a way that you could spare men enough to do that overseeing and economically expend that \$2,000,000?

Mr. PINCHOT. I think, when I read the amount that would be spent in each forest—I have a detailed estimate here for each forest—you will see, Mr. Chairman, that the problem becomes comparatively easy. For example, in California, on the Trinity National Forest the total expenditure would be \$15,000; on the Gunnison in Colorado, \$11,000; on the Las Animas, \$2,400, and so on. This money would be expended under the supervision of these various forest supervisors, who are, for the most part, thoroughly well-trained men. I will insert the detailed estimate in the record. It is as follows:

SUMMARY BY STATES.

| | | | |
|-----------------|-----------|-------------------|-----------|
| Arizona..... | \$166,281 | Oklahoma..... | \$901 |
| Arkansas..... | 30,575 | Oregon..... | 203,495 |
| California..... | 321,305 | South Dakota..... | 18,119 |
| Colorado..... | 194,655 | Utah..... | 107,660 |
| Idaho..... | 251,353 | Washington..... | 149,129 |
| Kansas..... | 1,402 | Wyoming..... | 111,227 |
| Montana..... | 252,177 | Alaska..... | 25,401 |
| Nebraska..... | 7,972 | Porto Rico..... | 965 |
| Nevada..... | 36,746 | | |
| New Mexico..... | 120,637 | Total..... | 2,000,000 |

DETAILED ESTIMATES BY STATES.

ARIZONA.

Summary by forests.

| | | | |
|---------------------------|---------|------------------------------|----------|
| Baboquivari..... | \$1,569 | San Francisco Mountains..... | \$24,412 |
| Black Mesa, N. and S..... | 31,790 | Santa Catalina..... | 5,030 |
| Chiricahua..... | 3,547 | Santa Rita..... | 6,069 |
| Draoon..... | 853 | Tonto..... | 13,781 |
| Grand Canyon..... | 28,909 | Tumacacori..... | 2,521 |
| Huachuca..... | 3,881 | Verde..... | 7,924 |
| Mount Graham..... | 1,743 | Contingent fund..... | 24,500 |
| Pinal Mountains..... | 569 | | |
| Prescott..... | 9,183 | Total..... | 166,281 |

Detailed estimates by forests.

| | |
|---|---------|
| Baboquivari: | |
| 10 miles drift fence, at \$125..... | \$1,250 |
| 2 miles pasture fence, at \$125..... | 250 |
| 3 watering troughs, at \$23..... | 69 |
| Total..... | 1,569 |
| Black Mesa, N. and S.: | |
| 150 miles telephone line, at \$60..... | 9,000 |
| 300 miles trails, at \$50..... | 15,000 |
| 8 cabins, at \$500..... | 4,000 |
| 8 barns, at \$75..... | 600 |
| 15 miles pasture fence, at \$125..... | 1,875 |
| 6 miles drift fence, at \$125..... | 750 |
| 3 bridges, at \$150..... | 450 |
| Inclosing 4 springs, at \$28.75..... | 115 |
| Total..... | 31,790 |
| Chiricahua: | |
| 1 cabin..... | 450 |
| 1 barn..... | 50 |
| 7 miles pasture fence, at \$125..... | 875 |
| 16 miles boundary or drift fence, at \$125..... | 2,000 |
| Water supply for stock..... | 172 |
| Total..... | 3,547 |
| Draoon, 6½ miles drift fence, at \$131.23..... | 853 |

Grand Canyon:

| | |
|--|----------------|
| 120 miles telephone line, at \$60..... | \$7, 200 |
| 16 miles drift fence, at \$125..... | 2, 000 |
| 5 miles road, at \$400..... | 2, 000 |
| Repairing road..... | 684 |
| Water supply for stock and use of forest officers, involving 9-mile pipe line..... | 15, 000 |
| 3 cabins, at \$425..... | 1, 275 |
| 6 miles pasture fence, at \$125..... | 750 |
| Total..... | 28, 909 |

Huachuca:

| | |
|--|---------------|
| 21 miles boundary drift fence, at \$125..... | 2, 625 |
| 6 miles pasture fence, at \$125..... | 750 |
| 1 cabin..... | 450 |
| 1 barn..... | 56 |
| Total..... | 3, 881 |

Mount Graham:

| | |
|--------------------------------------|---------------|
| 22 miles trail, at \$50..... | 1, 100 |
| 4 miles pasture fence, at \$125..... | 500 |
| 1 barn and repairs to cabins..... | 143 |
| Total..... | 1, 743 |

Pinal Mountains:

| | |
|-------------------|------------|
| 1 cabin..... | 490 |
| 1 barn..... | 79 |
| Total..... | 569 |

Prescott:

| | |
|--|---------------|
| 3 cabins, at \$550..... | 1, 650 |
| 3 barns, at \$75..... | 225 |
| 7 miles pasture fence, at \$110..... | 770 |
| 28 miles drift fence, at \$125..... | 3, 500 |
| 12 miles telephone line, at \$70..... | 840 |
| 30 miles trails, at \$55..... | 1, 650 |
| Repairing 12 miles road, at \$45.66..... | 548 |
| Total..... | 9, 183 |

San Francisco:

| | |
|---|----------------|
| 15 miles road, at \$400..... | 6, 000 |
| 100 miles trail, at \$45..... | 4, 500 |
| 49 miles telephone line, at \$60..... | 2, 940 |
| 73 miles telephone line, at \$75..... | 5, 475 |
| 7 cabins, at \$500..... | 3, 500 |
| 5 barns, at \$60..... | 300 |
| 10 miles pasture fence, at \$125..... | 1, 250 |
| Repairs to cabins, barns, watering..... | 447 |
| Total..... | 24, 412 |

Santa Catalina:

| | |
|---|---------------|
| 31 miles drift of boundary fence, at \$125..... | 3, 875 |
| 4 miles pasture fence, at \$125..... | 500 |
| 1 cabin..... | 540 |
| 1 barn..... | 65 |
| Repairs to fences..... | 50 |
| Total..... | 5, 030 |

Santa Rita:

| | |
|---|---------------|
| 2 cabins, at \$550..... | \$1, 100 |
| 2 barns, at \$75..... | 150 |
| 9 miles pasture fence, at \$125..... | 1, 125 |
| 12 miles drift fence, at \$125..... | 1, 500 |
| 7 miles fire break, at \$300..... | 2, 100 |
| Watering trough and inclosing spring..... | 94 |
| Total..... | 6, 069 |

Tonto:

| | |
|---|----------------|
| 90 miles telephone line, at \$75..... | 6 750 |
| 32 miles drift fences, at \$150..... | 4, 800 |
| 2 cabins, at \$600..... | 1, 200 |
| 2 barns, at \$75..... | 150 |
| 5 miles pasture fence, at \$125..... | 625 |
| 1 stone house..... | 156 |
| Painting and repairing to superintendent's house..... | 100 |
| Total..... | 13, 781 |

Tumacacori:

| | |
|--|---------------|
| 1 cabin..... | 450 |
| 1 barn..... | 75 |
| 3 miles pasture fence, at \$125..... | 375 |
| 13 miles drift fence, at \$124.69..... | 1, 621 |
| Total..... | 2, 521 |

Verde:

| | |
|--|---------------|
| 3 houses, at \$550..... | 1, 650 |
| 3 barns, at \$100..... | 300 |
| 22 miles trails, at \$60..... | 1, 320 |
| 8 miles road, at \$250..... | 2, 000 |
| 25 miles telephone line, at \$60..... | 1, 500 |
| 7 miles pasture fence, at \$125..... | 875 |
| 10 miles drift fence, at \$127.90..... | 1, 279 |
| Total..... | 7, 924 |

ARKANSAS.*Summary by forests*

| | |
|----------------------|----------------|
| Arkansas..... | \$13, 275 |
| Ozark..... | 15, 000 |
| Contingent fund..... | 2, 300 |
| Total..... | 30, 575 |

*Detailed estimates by forests.***Arkansas:**

| | |
|---------------------------------------|----------------|
| 100 miles telephone, at \$50..... | 5, 000 |
| 10 cabins, at \$450..... | 4, 500 |
| 10 barns, at \$75..... | 750 |
| 10 miles pasture fence, at \$125..... | 1, 250 |
| 7 miles fire line, at \$253.57..... | 1, 775 |
| Total..... | 13, 275 |

Ozark:

| | |
|---------------------------------------|----------------|
| 10 cabins, at \$500..... | 5, 000 |
| 10 barns, at \$75..... | 750 |
| 14 miles pasture fence, at \$125..... | 1, 750 |
| 40 miles telephone line, at \$60..... | 2, 400 |
| 16 miles fire line, at \$250..... | 4, 000 |
| 20 miles trails, at \$55..... | 1, 100 |
| Total..... | 15, 000 |

CALIFORNIA.

Summary by forests.

| | | | |
|-----------------------|---------|-----------------------|----------|
| Diamond Mountain..... | \$3,034 | Santa Barbara..... | \$24,498 |
| Inyo..... | 2,732 | Shasta..... | 18,838 |
| Klamath..... | 23,435 | Sierra..... | 62,419 |
| Lassen Peak..... | 12,843 | Stanislaus..... | 20,333 |
| Modoc..... | 3,560 | Stony Creek..... | 11,595 |
| Monterey..... | 4,140 | Tahoe..... | 17,245 |
| Pinnacles..... | 173 | Trabuco Canyon..... | 1,891 |
| Plumas..... | 9,741 | Trinity..... | 15,363 |
| San Benito..... | 1,730 | Warner Mountains..... | 3,795 |
| San Bernardino..... | 9,110 | Contingent fund..... | 36,000 |
| San Gabriel..... | 7,700 | | |
| San Jacinto..... | 21,643 | Total..... | 321,305 |
| San Luis Obispo..... | 4,487 | | |

Detailed estimates by forests.

| | |
|--|---------|
| Diamond Mountain: | |
| 30 miles telephone, at \$60..... | \$1,800 |
| 8 cabins, at \$500..... | 4,000 |
| 8 barns, at \$75..... | 600 |
| 12 miles pasture fence, at \$125..... | 1,500 |
| Repairs to cabins..... | 134 |
| Total..... | 8,084 |
| Inyo: | |
| 4 cabins, at \$500..... | 2,000 |
| 3 barns, at \$75..... | 225 |
| 4 miles pasture fence, at \$126.75..... | 507 |
| Total..... | 2,732 |
| Klamath: | |
| 12 cabins, at \$500..... | 6,000 |
| 10 barns, at \$75..... | 750 |
| 16 miles pasture fence, at \$125..... | 2,000 |
| 92 miles trails, at \$50..... | 4,600 |
| 90 miles telephone line, at \$60..... | 5,400 |
| 1 bridge..... | 600 |
| 11 bridges, at \$100..... | 1,100 |
| 8 miles road, at \$350..... | 2,800 |
| Repairing cabins and fences..... | 185 |
| Total..... | 23,435 |
| Lassen Peak: | |
| 10 cabins, at \$500..... | 5,000 |
| 8 barns, at \$75..... | 600 |
| 18 miles pasture fence, at \$125..... | 2,250 |
| 50 miles telephone lines, at \$55..... | 2,750 |
| 47 miles trails, at \$47.72..... | 2,243 |
| Total..... | 12,843 |
| Modoc: | |
| 5 cabins, at \$500..... | 2,500 |
| 4 barns, at \$75..... | 300 |
| 4 miles pasture fence, at \$125..... | 500 |
| Irrigating ditch and repairs to cabin..... | 260 |
| Total..... | 3,560 |
| Monterey: | |
| 4 cabins, at \$500..... | 2,000 |
| 4 barns, at \$75..... | 300 |
| 32 miles trails, at \$57.50..... | 1,840 |
| Total..... | 4,140 |

| | |
|---|---------------|
| Pinnacles, addition to cabin and repairs..... | \$173 |
| Plumas: | |
| 7 cabins, at \$500..... | 3,500 |
| 6 barns, at \$75..... | 450 |
| 12 miles pasture fence, at \$125..... | 1,500 |
| 32 miles telephone line, at \$60..... | 1,920 |
| 1 bridge (cooperation)..... | 600 |
| 3 bridges, at \$300..... | 900 |
| Road repairs, 6 miles, at \$75..... | 450 |
| Repairs to cabins and barns..... | 421 |
| Total..... | <u>9,741</u> |
| San Benito: | |
| 2 cabins, at \$500..... | 1,000 |
| 2 barns, at \$75..... | 150 |
| 4 miles pasture fence, at \$125..... | 500 |
| Storehouse..... | 80 |
| Total..... | <u>1,730</u> |
| San Bernardino: | |
| 4 cabins, at \$550..... | 2,200 |
| 4 barns, at \$75..... | 300 |
| 6 miles pasture fence, at \$125..... | 750 |
| 15 miles fire line, at \$350..... | 5,250 |
| 12 miles trails, at \$50.33..... | 610 |
| Total..... | <u>9,110</u> |
| San Gabriel: | |
| 4 cabins, at \$550..... | 2,200 |
| 4 barns, at \$75..... | 300 |
| 6 miles pasture fence, at \$125..... | 750 |
| 12 miles fire line, at \$350..... | 4,200 |
| 4 miles trails, at \$62.50..... | 250 |
| Total..... | <u>7,700</u> |
| San Jacinto: | |
| 30 miles road (cooperation), at \$200..... | 6,000 |
| 12 miles fire lines, at \$300..... | 3,600 |
| 8 cabins, at \$550..... | 4,400 |
| 8 barns, at \$75..... | 600 |
| 14 miles pasture fence, at \$125..... | 1,750 |
| 60 miles telephone line, at \$75..... | 4,500 |
| Repairing 60 miles trails, at \$13.20..... | 793 |
| Total..... | <u>21,643</u> |
| San Luis Obispo: | |
| 4 cabins, at \$500..... | 2,000 |
| 4 barns, at \$75..... | 300 |
| 6 miles pasture fence, at \$125..... | 750 |
| 4 miles telephone line, at \$75..... | 300 |
| 3 miles road, at \$200..... | 600 |
| 1 mile road..... | 537 |
| Total..... | <u>4,487</u> |
| Santa Barbara: | |
| 15 miles trails, at \$250..... | 3,750 |
| 120 miles trails, at \$60..... | 7,200 |
| 60 miles trails, at \$40..... | 2,400 |
| 6 cabins, at \$500..... | 3,000 |
| 6 barns, at \$75..... | 450 |
| 12 miles pasture fence, at \$125..... | 1,500 |
| 21 miles fire line, at \$295.15..... | 6,198 |
| Total..... | <u>24,498</u> |

Shasta:

| | |
|---------------------------------------|----------------|
| 6 cabins, at \$550..... | \$3, 300 |
| 6 barns, at \$80..... | 480 |
| 10 miles pasture fence, at \$125..... | 1, 250 |
| 70 miles telephone line, at \$60..... | 4, 200 |
| 2 bridges, at \$625..... | 1, 250 |
| 112 miles trail, at \$74.62..... | 8, 358 |
| Total..... | 18, 838 |

Sierra:

| | |
|---|----------------|
| 30 miles wagon road (cooperation), at \$533.33..... | 16, 000 |
| 26 cabins, at \$500..... | 13, 000 |
| 26 barns, at \$75..... | 1, 950 |
| 30 miles pasture fence, at \$125..... | 3, 750 |
| 240 miles trails, at \$60..... | 14, 400 |
| 150 miles telephone line, at \$50..... | 7, 500 |
| 2 bridges, at \$500..... | 1, 000 |
| 12 miles fire line, at \$300..... | 3, 600 |
| Repairs on 9 cabins and on trails..... | 1, 219 |
| Total..... | 62, 419 |

Stanislaus:

| | |
|---------------------------------------|----------------|
| 12 cabins, at \$500..... | 6, 000 |
| 12 barns, at \$75..... | 900 |
| 16 miles pasture fence, at \$125..... | 2, 000 |
| 6 bridges, at \$200..... | 1, 200 |
| 70 miles telephone line, at \$60..... | 4, 200 |
| 100 miles trails, at \$60.33..... | 6, 033 |
| Total..... | 20, 333 |

Stony Creek:

| | |
|--|----------------|
| 1 bridge (cooperative)..... | 900 |
| 5 cabins, at \$600..... | 3, 000 |
| 4 barns, at \$75..... | 300 |
| 10 miles pasture fence, at \$125..... | 1, 250 |
| 60 miles trails, at \$60..... | 3, 600 |
| 40 miles telephone lines, at \$60..... | 2, 400 |
| Repairs to fences and cabins..... | 145 |
| Total..... | 11, 595 |

Tahoe:

| | |
|---------------------------------------|----------------|
| 8 cabins, at \$550..... | 4, 400 |
| 8 barns, at \$75..... | 600 |
| 12 miles pasture fence, at \$125..... | 1, 500 |
| 2 bridges, at \$700..... | 1, 400 |
| 60 miles telephone line, at \$60..... | 3, 600 |
| 96 miles trails, at \$59.85..... | 5, 745 |
| Total..... | 17, 245 |

Trabuco Canyon:

| | |
|--------------------------------------|---------------|
| 2 cabins, at \$500..... | 1, 000 |
| 2 barns, at \$75..... | 150 |
| 4 miles pasture fence, at \$125..... | 500 |
| 3 miles trails, at \$80.33..... | 241 |
| Total..... | 1, 891 |

Trinity:

| | |
|---------------------------------------|----------------|
| 10 cabins, at \$600..... | 6, 000 |
| 10 barns, at \$75..... | 750 |
| 14 miles pasture fence, at \$125..... | 1, 750 |
| 140 miles trails, at \$49..... | 6, 863 |
| Total..... | 15, 363 |

Warner Mountains:

| | |
|--------------------------------------|----------|
| 4 cabins, at \$500..... | \$2, 000 |
| 4 barns, at \$75..... | 300 |
| 7 miles pasture fence, at \$125..... | 875 |
| 10 miles trails, at \$50..... | 500 |
| Repairs..... | 120 |
| Total..... | 3, 795 |

COLORADO.

Summary by forests.

| | | | |
|----------------------|----------|--------------------|----------|
| Battlement Mesa..... | \$9, 864 | Ouray..... | \$3, 125 |
| Cochetopa..... | 14, 013 | Park Range..... | 14, 015 |
| Fruita..... | 98 | Pikes Peak..... | 20, 789 |
| Gunnison..... | 11, 135 | San Isabel..... | 3, 967 |
| Holy Cross..... | 13, 313 | San Juan..... | 27, 240 |
| La Sal..... | 370 | Uncompahgre..... | 7, 700 |
| Las Animas..... | 2, 422 | Wet Mountains..... | 2, 965 |
| Leadville..... | 15, 079 | White River..... | 12, 001 |
| Medicine Bow..... | 16, 636 | | |
| Montezuma..... | 19, 923 | Total..... | 194, 655 |

Detailed estimates by forests.

Battlement Mesa:

| | |
|--|----------|
| 5 miles wagon road, at \$470..... | \$2, 350 |
| 6 cabins, at \$500..... | 3, 000 |
| 6 barns, at \$75..... | 450 |
| 8 miles pasture fence, at \$125..... | 1, 000 |
| 10 miles drift fence, at \$125..... | 1, 250 |
| 4 bridges, at \$150..... | 600 |
| 10 miles telephone line, at \$60..... | 600 |
| Inclosing springs, watering troughs and repairs..... | 614 |

Total..... 9, 864

Cochetopa:

| | |
|---------------------------------------|--------|
| 8 cabins, at \$550..... | 4, 400 |
| 8 barns, at \$75..... | 600 |
| 12 miles pasture fence, at \$125..... | 1, 500 |
| 15 miles drift fence, at \$125..... | 1, 875 |
| 120 miles trails, at \$46.98..... | 5, 638 |

Total..... 14, 013

Fruita, three-fourths mile pasture fence.....

98

Gunnison:

| | |
|--|--------|
| 80 miles telephone line, at \$58.56..... | 4, 685 |
| 7 cabins, at \$500..... | 3, 500 |
| 6 barns, at \$75..... | 450 |
| 10 miles pasture fence, at \$125..... | 1, 250 |
| 10 miles drift fence, at \$125..... | 1, 250 |

Total..... 11, 135

Holy Cross:

| | |
|---|--------|
| 8 cabins, at \$550..... | 4, 400 |
| 8 barns, at \$75..... | 600 |
| 12 miles pasture fence, at \$125..... | 1, 500 |
| Repairs to 6 cabins and barns, at \$50..... | 350 |
| 60 miles telephone line, at \$60..... | 3, 600 |
| 3 bridges, at \$216.67..... | 650 |
| Repairs to 50 miles trails, at \$14..... | 700 |
| 24 miles trails, at \$61.38..... | 1, 513 |

Total..... 13, 313

La Sal, 1 cabin..... 370

Las Animas:

| | |
|---|--------------|
| 3 cabins, at \$516.67..... | \$1,550 |
| 3 barns, at \$75..... | 225 |
| 5 miles pasture fence, at \$129.40..... | 647 |
| Total..... | 2,422 |

Leadville:

| | |
|--|---------------|
| 100 miles trails, at \$60..... | 6,000 |
| 8 cabins, at \$500..... | 4,800 |
| 8 barns, at \$75..... | 600 |
| 10 miles pasture fence, at \$125..... | 1,250 |
| 40 miles telephone line, at \$60.72..... | 2,429 |
| Total..... | 15,079 |

Medicine Bow:

| | |
|---------------------------------------|---------------|
| 80 miles telephone line, at \$60..... | 4,800 |
| 80 miles trails, at \$60..... | 4,800 |
| 8 cabins, at \$500..... | 4,000 |
| 6 barns, at \$75..... | 450 |
| 10 miles pasture fence, at \$125..... | 1,250 |
| 4 miles road, at \$334..... | 1,336 |
| Total..... | 16,636 |

Montezuma:

| | |
|--|---------------|
| 8 cabins, at \$550..... | 4,400 |
| 8 barns, at \$75..... | 600 |
| 15 miles pasture fence, at \$125..... | 1,875 |
| 30 miles drift fence, at \$125..... | 3,750 |
| 120 miles trails, at \$60..... | 7,200 |
| 38 miles telephone line, at \$55.21..... | 2,098 |
| Total..... | 19,923 |

Ouray:

| | |
|--------------------------------------|--------------|
| 3 cabins, at \$500..... | 1,500 |
| 3 barns, at \$75..... | 225 |
| 4 miles pasture fence, at \$125..... | 500 |
| 9 miles drift fence, at \$100..... | 900 |
| Total..... | 3,125 |

Park Range:

| | |
|--|---------------|
| 10 cabins, at \$550..... | 5,500 |
| 10 barns, at \$75..... | 750 |
| 16 miles pasture fence, at \$125..... | 2,000 |
| 8 miles drift fence, at \$125..... | 1,000 |
| 60 miles trails, at \$50..... | 3,000 |
| 35 miles telephone line, at \$50.43..... | 1,765 |
| Total..... | 14,015 |

Pikes Peak:

| | |
|---|---------------|
| 10 cabins, at \$550..... | 5,500 |
| 10 barns, at \$75..... | 750 |
| 16 miles pasture fence, at \$125..... | 2,000 |
| 50 miles boundary or drift fence, at \$125..... | 6,250 |
| 80 miles trails, at \$50..... | 4,000 |
| 40 miles telephone line, at \$57.22..... | 2,289 |
| Total..... | 20,789 |

San Isabel:

| | |
|---|----------|
| 3 cabins, at \$500..... | \$1, 500 |
| 3 barns, at \$75..... | 225 |
| 6 miles pasture fence, at \$125..... | 750 |
| 10 miles drift fence, at \$125..... | 1, 250 |
| Inclosing springs and placing watering troughs..... | 242 |

Total..... 3, 967

San Juan:

| | |
|---|--------|
| 8 cabins, at \$550..... | 4, 400 |
| 8 barns, at \$75..... | 600 |
| 12 miles pasture fence, at \$125..... | 1, 500 |
| 120 miles telephone lines, at \$60..... | 7, 200 |
| 160 miles trails, at \$60..... | 9, 600 |
| 30 miles drift fence, at \$125..... | 3, 750 |
| Repairs to cabins..... | 190 |

Total..... 27, 240

Uncompahgre:

| | |
|---------------------------------------|--------|
| 40 miles telephone line, at \$60..... | 2, 400 |
| 4 cabins, at \$500..... | 2, 000 |
| 4 barns, at \$75..... | 300 |
| 6 miles pasture fence, at \$125..... | 750 |
| 2 bridges, at \$175..... | 350 |
| 3 miles road, at \$183.33..... | 550 |
| 4 miles drift fence, at \$125..... | 500 |
| 17 miles trails, at \$50..... | 850 |

Total..... 7, 700

Wet Mountains:

| | |
|--------------------------------------|--------|
| 2 cabins, at \$500..... | 1, 000 |
| 2 barns, at \$75..... | 150 |
| 4 miles pasture fence, at \$125..... | 500 |
| 25 miles trails, at \$56.60..... | 1, 315 |

Total..... 2, 965

White River:

| | |
|--|--------|
| 12 miles wagon road (cooperation), at \$125..... | 1, 500 |
| 44 miles telephone line, at \$60..... | 2, 640 |
| 4 cabins, at \$500..... | 2, 000 |
| 4 barns, at \$75..... | 300 |
| 6 miles pasture fence, at \$125..... | 750 |
| 2 cattle drives, at \$150..... | 300 |
| 3 bridges, at \$266.67..... | 800 |
| 20 miles drift fence, at \$125..... | 2, 500 |
| 25 miles trails, at \$48.44..... | 1, 211 |

Total..... 12, 001

IDAHO.

Summary by forests.

| | | | |
|--------------------|----------|-------------------|-----------|
| Bear River..... | \$5, 129 | Payette..... | \$18, 058 |
| Big Hole..... | 3, 758 | Pocatello..... | 618 |
| Bitter Root..... | 47, 722 | Port Neuf..... | 1, 236 |
| Cabinet..... | 6, 118 | Priest River..... | 10, 073 |
| Caribou..... | 9, 060 | Raft River..... | 3, 621 |
| Cassia..... | 4, 030 | Salmon River..... | 23, 237 |
| Coeur d'Alene..... | 28, 811 | Sawtooth..... | 41, 282 |
| Henrys Lake..... | 9, 876 | Weiser..... | 13, 917 |
| Kootenai..... | 2, 040 | Yellowstone..... | 3, 745 |
| Lemhi..... | 16, 624 | | |
| Palouse..... | 2, 398 | Total..... | 251, 353 |

Detailed estimates by forests.

| | |
|--|----------------|
| Bear River: | |
| 5 cabins, at \$550..... | \$2, 750 |
| 5 barns, at \$75..... | 375 |
| 8 miles pasture fence, at \$125..... | 1, 000 |
| 22 miles telephone lines, at \$45.64..... | 1, 004 |
| Total..... | 5, 129 |
| Big Hole: | |
| 3 cabins, at \$500..... | 1, 500 |
| 2 barns, at \$75..... | 150 |
| 6 miles pasture fence, at \$125..... | 750 |
| 25 miles trails, at \$54.32..... | 1, 358 |
| Total..... | 3, 758 |
| Bitter Root: | |
| 280 miles trails, at \$75..... | 21, 000 |
| 12 miles road, at \$300..... | 3, 600 |
| 80 miles telephone lines, at \$50..... | 4, 000 |
| 20 miles trails, at \$150..... | 3, 000 |
| 3 bridges, at \$500..... | 1, 500 |
| 10 cabins, at \$550..... | 5, 500 |
| 10 barns, at \$75..... | 750 |
| 12 miles pasture fence, at \$125..... | 1, 500 |
| Cooperative road construction with State and county..... | 6, 000 |
| Repairs to 60 miles trails, at \$14.53..... | 872 |
| Total..... | 47, 722 |
| Cabinet: | |
| 26 miles telephone lines, at \$50..... | 1, 300 |
| 4 cabins, at \$500..... | 2, 000 |
| 4 barns, at \$75..... | 300 |
| 8 miles pasture fence, at \$125..... | 1, 000 |
| 30 miles trails, at \$50.60..... | 1, 518 |
| Total..... | 6, 118 |
| Caribou: | |
| Repairing 30 miles road, at \$450..... | 1, 350 |
| 4 cabins, at \$500..... | 2, 000 |
| 4 barns, at \$75..... | 300 |
| 6 miles pasture fence, at \$125..... | 750 |
| 70 miles trails, at \$40..... | 2, 800 |
| 12 miles drift fence, at \$125..... | 1, 500 |
| Repairs to cabins..... | 360 |
| Total..... | 9, 060 |
| Cassia: | |
| 5 cabins, at \$500..... | 2, 500 |
| 5 barns, at \$75..... | 375 |
| 9 miles pasture fence, at \$128.33..... | 1, 155 |
| Total..... | 4, 030 |
| Coeur d'Alene: | |
| 160 miles trails, at \$40..... | 6, 400 |
| 140 miles trails, at \$75..... | 10, 500 |
| 40 miles trails, at \$100..... | 4, 000 |
| 6 cabins, at \$550..... | 3, 300 |
| 6 barns, at \$100..... | 600 |
| 8 miles pasture fence, at \$125..... | 1, 000 |
| 50 miles telephone lines, at \$60.22..... | 3, 011 |
| Total..... | 28, 811 |

Henry's Lake:

| | |
|---|--------------|
| 6 cabins, at \$500..... | \$3,000 |
| 6 barns, at \$75..... | 450 |
| 8 miles pasture fence, at \$125..... | 1,000 |
| 52 miles trails, at \$50..... | 2,600 |
| 50 miles telephone lines, at \$56.52..... | 2,826 |
| Total..... | <u>9,876</u> |

Kootenai:

| | |
|-------------------------------|--------------|
| 1 cabin..... | 450 |
| 1 barn..... | 90 |
| 1 mile pasture fence..... | 125 |
| 25 miles trails, at \$55..... | 1,375 |
| Total..... | <u>2,040</u> |

Lemhi:

| | |
|--|---------------|
| 120 miles telephone lines, at \$60..... | 7,200 |
| 7 bridges, at \$142.86..... | 1,000 |
| 80 miles trails, at \$50..... | 4,000 |
| 5 cabins, at \$500..... | 2,500 |
| 5 barns, at \$75..... | 375 |
| 12 miles pasture fence, at \$129.08..... | 1,549 |
| Total..... | <u>16,624</u> |

Palouse:

| | |
|--------------------------------------|--------------|
| 2 miles pasture fence, at \$125..... | 250 |
| 1 cabin..... | 500 |
| 30 miles trails, at \$54.93..... | 1,648 |
| Total..... | <u>2,398</u> |

Payette:

| | |
|---|---------------|
| 160 miles trails, at \$60..... | 9,600 |
| 5 cabins, at \$500..... | 2,500 |
| 4 barns, at \$75..... | 300 |
| 8 miles pasture fence, at \$125..... | 1,000 |
| Cooperative road work..... | 1,200 |
| 60 miles telephone lines, at \$57.63..... | 3,458 |
| Total..... | <u>18,058</u> |

Pocatello:

| | |
|---|------------|
| 1 cabin..... | 450 |
| 1 barn..... | 75 |
| $\frac{1}{2}$ mile pasture fence, at \$124..... | 93 |
| Total..... | <u>618</u> |

Port Neuf:

| | |
|--------------------------------------|--------------|
| 1 cabin..... | 500 |
| 1 barn..... | 75 |
| 1 storehouse..... | 125 |
| 4 miles pasture fence, at \$134..... | 536 |
| Total..... | <u>1,236</u> |

Priest River:

| | |
|--------------------------------------|---------------|
| 8 cabins, at \$600..... | 4,800 |
| 8 barns, at \$75..... | 600 |
| 8 miles pasture fence, at \$125..... | 1,000 |
| 78 miles trails at \$47.09..... | 3,673 |
| Total..... | <u>10,073</u> |

Raft River:

| | |
|---------------------------------------|---------|
| 2 cabins, at \$500..... | \$1,000 |
| 1 barn..... | 75 |
| 2 miles pasture fence, at \$125..... | 250 |
| 8 miles drift fence, at \$125..... | 1,000 |
| 10 miles telephone line, at \$60..... | 600 |
| 2 bridges, at \$150..... | 300 |
| Repairs to roads and cabins..... | 396 |

| | |
|------------|-------|
| Total..... | 3,621 |
|------------|-------|

Salmon River:

| | |
|--|--------|
| 170 miles trails, at \$60..... | 10,200 |
| 70 miles telephone lines at \$60..... | 4,200 |
| 8 cabins, at \$500..... | 4,000 |
| 8 barns, at \$75..... | 600 |
| 11 miles pasture fence at \$125..... | 1,375 |
| Cooperative road work with county and State..... | 2,000 |
| Repairs on road, including 3 bridges..... | 862 |

| | |
|------------|--------|
| Total..... | 23,237 |
|------------|--------|

Sawtooth:

| | |
|---|--------|
| 300 miles trails, at \$60..... | 18,000 |
| 150 miles telephone lines, at \$80..... | 12,000 |
| Cooperative work with State, wagon roads..... | 3,500 |
| 8 cabins, at \$500..... | 4,000 |
| 8 barns, at \$75..... | 600 |
| 12 miles pasture fence at \$125..... | 1,500 |
| 1 bridge..... | 525 |
| 3 bridges, at \$133.33..... | 400 |
| Repairs on 82 miles trails, at \$9.17..... | 757 |

| | |
|------------|--------|
| Total..... | 41,282 |
|------------|--------|

Weiser:

| | |
|--|-------|
| Cooperative road work with county..... | 2,500 |
| 70 miles telephone line at \$60..... | 4,200 |
| 5 cabins, at \$500..... | 2,500 |
| 4 barns, at \$75..... | 300 |
| 6 miles pasture fence, at \$125..... | 750 |
| 60 miles trails, at \$50..... | 3,000 |
| Repairs on trails and cabin..... | 667 |

| | |
|------------|--------|
| Total..... | 13,917 |
|------------|--------|

Yellowstone:

| | |
|---|-------|
| 2 cabins, at \$500..... | 1,000 |
| 2 barns, at \$75..... | 150 |
| 3 miles pasture fence, at \$125..... | 375 |
| 15 miles trails, at \$81.33..... | 1,220 |
| 18 miles telephone line at \$55.55..... | 1,000 |

| | |
|------------|-------|
| Total..... | 3,745 |
|------------|-------|

KANSAS.

Summary.

| | |
|----------------------|-------|
| Garden City..... | 1,202 |
| Contingent fund..... | 200 |

| | |
|------------|-------|
| Total..... | 1,402 |
|------------|-------|

Detailed estimate.

Garden City:

| | |
|--------------------------------------|-----|
| 4 miles fire line, at \$150..... | 600 |
| Addition to cabin..... | 202 |
| Barn..... | 100 |
| Repairs on fences and buildings..... | 300 |

| | |
|------------|-------|
| Total..... | 1,202 |
|------------|-------|

MONTANA.

Summary by forests.

| | | | |
|--------------------------|----------|-----------------------|-----------|
| Big Belt..... | \$7, 930 | Little Belt..... | \$13, 018 |
| Big Hole..... | 19, 937 | Little Rockies..... | 383 |
| Bitter Root..... | 8, 553 | Lolo..... | 14, 976 |
| Cabinet..... | 19, 361 | Long Pine..... | 1, 377 |
| Crazy Mountains | 2, 902 | Madison..... | 11, 851 |
| Ekalaka..... | 418 | Missoula..... | 2, 403 |
| Elkhorn..... | 2, 301 | Otter..... | 7, 301 |
| Gallatin..... | 10, 984 | Pryor Mountains | 973 |
| Helena..... | 9, 668 | Snowy Mountains | 1, 567 |
| Hell Gate..... | 19, 558 | Yellowstone..... | 16, 713 |
| Highwood Mountains | 556 | | |
| Kootenai..... | 10, 968 | Total..... | 252, 177 |
| Lewis and Clark | 68, 489 | | |

Detailed estimates by forests.

| | | |
|---|--|----------------|
| Big Belt: | | |
| 56 miles trails, at \$75..... | | \$4, 200 |
| 4 cabins, at \$500..... | | 2, 000 |
| 4 barns, at \$75..... | | 300 |
| 6 miles pasture fence, at \$125..... | | 750 |
| 12 miles telephone line, at \$56.67..... | | 680 |
| Total..... | | <u>7, 930</u> |
| Big Hole: | | |
| 10 miles road, at \$300..... | | 3, 000 |
| 120 miles trails, at \$60..... | | 7, 200 |
| 6 cabins, at \$500..... | | 3, 000 |
| 6 barns, at \$75..... | | 450 |
| 10 miles pasture fence, at \$125..... | | 1, 250 |
| 50 miles telephone line, at \$60..... | | 3, 000 |
| 4 miles fire line, at \$300..... | | 1, 200 |
| 1 bunk house..... | | 287 |
| Repairs on roads, trails, and cabins..... | | 550 |
| Total..... | | <u>19, 937</u> |
| Bitter Root: | | |
| 4 cabins, at \$500..... | | 2, 000 |
| 4 barns, at \$75..... | | 300 |
| 4 miles pasture fence, at \$125..... | | 500 |
| 92 miles trails, at \$62.53..... | | 5, 753 |
| Total..... | | <u>8, 553</u> |
| Cabinet: | | |
| 220 miles trails, at \$60..... | | 13, 200 |
| 7 cabins, at \$500..... | | 3, 500 |
| 6 barns, at \$75..... | | 450 |
| 8 miles pasture fence, at \$125..... | | 1, 000 |
| 20 miles telephone lines, at \$60.55..... | | 1, 211 |
| Total..... | | <u>19, 361</u> |
| Crazy Mountains: | | |
| 3 cabins, at \$550..... | | 1, 650 |
| 3 barns, at \$80..... | | 240 |
| 4 miles pasture fence, at \$125..... | | 500 |
| 4 miles drift fence, at \$128..... | | 512 |
| Total..... | | <u>2, 902</u> |
| Ekalaka, 1 cabin..... | | 418 |

AGRICULTURAL APPROPRIATION BILL.

313

Elkhorn:

| | |
|--|--------------|
| 2 cabins, at \$550..... | \$1,100 |
| 2 barns, at \$75..... | 150 |
| 3 miles pasture fence, at \$125..... | 375 |
| Cleaning out and repairing 25 miles old road, at \$15..... | 375 |
| 6 miles telephone line, at \$50.16..... | 301 |
| Total..... | <u>2,301</u> |

Gallatin:

| | |
|---|---------------|
| 66 miles telephone line, at \$60..... | 3,960 |
| 105 miles trail, at \$38.28..... | 4,020 |
| 4 cabins, at \$500..... | 2,000 |
| 4 barns, at \$75..... | 300 |
| 5 miles pasture fence, at \$140.80..... | 704 |
| Total..... | <u>10,984</u> |

Helena:

| | |
|---------------------------------------|--------------|
| 45 miles trails, at \$50..... | 2,250 |
| 52 miles telephone line, at \$60..... | 3,120 |
| 5 cabins, at \$600..... | 3,000 |
| 6 miles pasture fence, at \$133..... | 798 |
| 5 barns, at \$100..... | 500 |
| Total..... | <u>9,668</u> |

Hell Gate:

| | |
|---|---------------|
| 8 cabins, at \$550..... | 4,400 |
| 8 barns, at \$75..... | 600 |
| 10 miles pasture fence, at \$125..... | 1,250 |
| 200 miles trails, at \$60..... | 12,000 |
| 22 miles telephone lines, at \$59.45..... | 1,308 |
| Total..... | <u>19,558</u> |

Highwood Mountains:

| | |
|--------------|------------|
| 1 cabin..... | 475 |
| 1 barn..... | 81 |
| Total..... | <u>556</u> |

Kootenai:

| | |
|---|---------------|
| 110 miles trails, at \$60..... | 6,600 |
| 4 cabins, at \$550..... | 2,200 |
| 4 barns, at \$90..... | 360 |
| 5 miles pasture fence, at \$125..... | 625 |
| 20 miles telephone lines, at \$59.15..... | 1,183 |
| Total..... | <u>10,968</u> |

Lewis and Clark:

| | |
|---|---------------|
| 250 miles trail, at \$50..... | 12,500 |
| 120 miles trail, at \$75..... | 9,000 |
| 150 miles trail, at \$40..... | 6,000 |
| 75 miles trail, at \$100..... | 7,500 |
| 1 bridge..... | 2,000 |
| 4 bridges, at \$162.50..... | 650 |
| Cooperative road work..... | 4,500 |
| Repairing 60 miles road, at \$15..... | 900 |
| 180 miles telephone lines, at \$60..... | 10,800 |
| 12 cabins, at \$600..... | 7,200 |
| 12 barns, at \$100..... | 1,200 |
| 16 miles pasture fence, at \$125..... | 2,000 |
| 2 bunk houses, at \$175..... | 350 |
| 11 miles road, at \$300..... | 3,300 |
| Repairs to cabins..... | 589 |
| Total..... | <u>68,489</u> |

Little Belt:

| | |
|--|---------------|
| 52 miles trails, at \$75..... | \$3,900 |
| 60 miles telephone lines, at \$60..... | 3,600 |
| 5 cabins, at \$600..... | 3,000 |
| 5 barns, at \$80..... | 400 |
| 7 miles pasture fence, at \$125..... | 875 |
| 1 bunk house..... | 200 |
| Addition to 2 cabins, at \$221.50..... | 443 |
| Repairing trails and cabins..... | 600 |
| Total..... | <u>13,018</u> |

Little Rockies:

| | |
|--------------------------------------|------------|
| 2 miles pasture fence, at \$125..... | 250 |
| Barn..... | 75 |
| Repairs to house..... | 58 |
| Total..... | <u>383</u> |

Lolo:

| | |
|--|---------------|
| 125 miles trails, at \$80..... | 10,000 |
| 6 cabins, at \$550..... | 3,300 |
| 6 barns, at \$75..... | 450 |
| 10 miles pasture fence, at \$122.60..... | 1,226 |
| Total..... | <u>14,976</u> |

Long Pine:

| | |
|--|--------------|
| 1 cabin..... | 550 |
| 1 barn..... | 100 |
| 4 miles pasture fence, at \$125..... | 500 |
| Clearing out old trails and roads..... | 227 |
| Total..... | <u>1,377</u> |

Madison:

| | |
|--------------------------------------|---------------|
| 100 miles trails, at \$75..... | 7,500 |
| 5 cabins, at \$500..... | 2,500 |
| 5 barns, at \$80..... | 400 |
| 6 miles pasture fence, at \$125..... | 750 |
| 4 miles drift fence, at \$125..... | 500 |
| Repairs to cabins and trails..... | 201 |
| Total..... | <u>11,851</u> |

Missoula:

| | |
|---|--------------|
| 3 cabins, at \$500..... | 1,500 |
| 3 barns, at \$75..... | 225 |
| 5 miles pasture fence, at \$135.60..... | 678 |
| Total..... | <u>2,403</u> |

Otter:

| | |
|--|--------------|
| 4 cabins, at \$500..... | 2,000 |
| 4 barns, at \$75..... | 300 |
| 6 miles pasture fence, at \$125..... | 750 |
| 50 miles telephone lines, at \$60..... | 3,000 |
| 6 miles drift fence, at \$125..... | 750 |
| Repairs to roads and trails..... | 301 |
| Addition to cabin..... | 200 |
| Total..... | <u>7,301</u> |

Pryor Mountains:

| | |
|---|------------|
| 1 cabin..... | 500 |
| 1 barn..... | 100 |
| 3 miles pasture fence, at \$124.33..... | 373 |
| Total..... | <u>973</u> |

AGRICULTURAL APPROPRIATION BILL.

315

Snowy Mountains:

| | |
|--------------------------------------|-------|
| 1 cabin..... | \$500 |
| 1 barn..... | 75 |
| 2 miles pasture fence, at \$125..... | 250 |
| 10 miles trails, at \$50..... | 500 |
| 2 miles drift fence, at \$116..... | 232 |
| Total..... | 1,557 |

Yellowstone:

| | |
|---|--------|
| 150 miles trails, at \$60..... | 9,000 |
| 60 miles telephone lines, at \$60..... | 3,600 |
| 5 cabins, at \$550..... | 2,750 |
| 5 barns, at \$90..... | 450 |
| 7 miles pasture fence, at \$130.43..... | 913 |
| Total..... | 16,713 |

NEBRASKA.

Summary by forests.

| | | | |
|-------------------|---------|----------------------|---------|
| Dismal River..... | \$1,051 | Contingent fund..... | \$1,100 |
| Niobrara..... | 1,530 | | |
| North Platte..... | 4,291 | Total..... | 7,972 |

Detailed estimates by forests.

Dismal River:

| | |
|--|-------|
| 6 miles fire breaks, at \$125..... | \$750 |
| Barn..... | 100 |
| Repairing cabin and other buildings..... | 201 |
| Total..... | 1,051 |

Niobrara:

| | |
|---|-------|
| 3 miles fence, at \$125..... | 375 |
| 20 miles telephone lines, at \$57.75..... | 1,155 |
| Total..... | 1,530 |

North Platte:

| | |
|---|-------|
| 10 miles fire breaks, at \$125..... | 1,250 |
| 1 cabin..... | 600 |
| 1 barn..... | 100 |
| 1 storehouse..... | 250 |
| 2 miles hog-tight fence, at \$250..... | 500 |
| 34 miles telephone lines, at \$46.80..... | 1,591 |
| Total..... | 4,291 |

NEVADA.

Summary by forests.

| | | | |
|---------------------|---------|----------------------|---------|
| Charleston..... | \$1,842 | Toquima..... | \$4,548 |
| Independence..... | 1,669 | Vegas..... | 2,420 |
| Monitor..... | 7,079 | Contingent fund..... | 5,500 |
| Ruby Mountains..... | 5,235 | | |
| Tahoe..... | 729 | Total..... | 36,746 |
| Toiyabe..... | 7,724 | | |

Detailed estimates by forests.

Charleston:

| | |
|--|-------|
| 1 cabin..... | \$650 |
| 1 barn..... | 150 |
| 2 miles pasture fence, at \$150..... | 300 |
| 5 miles boundary drift fence, at \$148.40..... | 742 |
| Total..... | 1,842 |

Independence:

| | |
|--------------------------------------|-------|
| 1 cabin..... | \$650 |
| 1 barn..... | 150 |
| 5 miles pasture fence, at \$150..... | 750 |
| Repairs to cabins..... | 119 |
| Total..... | 1,669 |

Monitor:

| | |
|---|-------|
| 2 cabins, at \$600..... | 1,200 |
| 2 barns, at \$100..... | 200 |
| 5 miles pasture fence, at \$125..... | 625 |
| 15 miles trails, at \$100..... | 1,500 |
| 28 miles telephone lines, at \$89.29..... | 2,500 |
| 7 miles boundary fence, at \$150.57..... | 1,054 |
| Total..... | 7,079 |

Ruby Mountains:

| | |
|--------------------------------------|-------|
| 2 cabins, at \$600..... | 1,200 |
| 2 barns, at \$100..... | 200 |
| 4 miles pasture fence, at \$125..... | 600 |
| 20 miles trails, at \$100..... | 2,000 |
| 5 miles fire lines, at \$247..... | 1,235 |
| Total..... | 5,235 |

Tahoe:

| | |
|-------------------------------------|-----|
| 1 mile pasture fence, at \$125..... | 125 |
| 14 miles trails, at \$43.14..... | 604 |
| Total..... | 729 |

Toiyabe:

| | |
|---|-------|
| 2 cabins, at \$650..... | 1,300 |
| 2 barns, at \$125..... | 250 |
| 5 miles pasture fence, at \$150..... | 750 |
| 36 miles telephone lines, at \$78.88..... | 2,840 |
| Irrigating ditches and piping for water supply..... | 720 |
| Repairing 4 miles road, at \$100..... | 400 |
| 10 miles drift fence, at \$146.40..... | 1,464 |
| Total..... | 7,724 |

Toquima:

| | |
|--|-------|
| 2 cabins, at \$650..... | 1,300 |
| 2 barns, at \$125..... | 250 |
| 6 miles pasture fence, at \$150..... | 900 |
| Irrigating ditches and piping water on 2 ranger sites..... | 780 |
| 19 miles telephone line, at \$69.37..... | 1,318 |
| Total..... | 4,548 |

Vegas:

| | |
|--------------------------------------|-------|
| 2 cabins, at \$650..... | 1,300 |
| 2 barns, at \$125..... | 250 |
| 6 miles pasture fence, at \$145..... | 870 |
| Total..... | 2,420 |

NEW MEXICO.

Summary by forests.

| | | | |
|-----------------|---------|----------------------|---------|
| Big Burros..... | \$1,941 | Mount Taylor..... | \$1,372 |
| Gallinas..... | 964 | Pecos..... | 5,327 |
| Gila..... | 34,893 | Peloncillo..... | 2,212 |
| Guadalupe..... | 3,499 | Sacramento..... | 10,903 |
| Jemez..... | 18,047 | San Mateo..... | 5,253 |
| Lincoln..... | 7,750 | Taos..... | 2,880 |
| Las Animas..... | 6 | Contingent fund..... | 18,000 |
| Magdalena..... | 1,903 | | |
| Manzano..... | 5,687 | Total..... | 120,637 |

Detailed estimates by forests.

| | |
|--|---------------|
| Big Burros: | |
| 1 cabin..... | \$500 |
| 1 barn..... | 100 |
| 2 miles pasture fence, at \$125..... | 250 |
| 9 miles drift fence, at \$121.22..... | 1,091 |
| Total..... | <u>1,941</u> |
| Gallinas: | |
| 1 cabin..... | 500 |
| 1 barn..... | 100 |
| 3 miles pasture fence, at \$121.33..... | 364 |
| Total..... | <u>964</u> |
| Gila: | |
| 150 miles trails, at \$60..... | 9,000 |
| 60 miles road, at \$100..... | 6,000 |
| 120 miles telephone line, at \$75..... | 9,000 |
| 12 cabins, at \$550..... | 6,600 |
| 12 barns, at \$75..... | 900 |
| 16 miles pasture fence, at \$125..... | 2,000 |
| 11 miles drift fence, at \$126.63..... | 1,393 |
| Total..... | <u>34,893</u> |
| Guadalupe: | |
| 2 cabins, at \$500..... | 1,000 |
| 2 barns, at \$100..... | 200 |
| 6 miles pasture fence, at \$125..... | 750 |
| 12 miles drift fence, at \$129.08..... | 1,549 |
| Total..... | <u>3,499</u> |
| Jemez: | |
| 60 miles telephone line, at \$75..... | 4,500 |
| 10 cabins, at \$500..... | 5,000 |
| 10 barns, at \$75..... | 750 |
| 16 miles pasture fence, at \$125..... | 2,000 |
| 80 miles trails, at \$60..... | 4,800 |
| 8 miles drift fence, at \$124.62..... | 997 |
| Total..... | <u>18,047</u> |
| Lincoln: | |
| 2 cabins, at \$500..... | 1,000 |
| 2 barns, at \$100..... | 200 |
| 5 miles pasture fence, at \$125..... | 625 |
| 4 corrals, at \$50..... | 200 |
| Piping water supply..... | 350 |
| 20 miles drift fence, at \$125..... | 2,500 |
| Repairing roads and trails..... | 420 |
| 30 miles trails, at \$32..... | 960 |
| 30 miles telephone line, at \$49.83..... | 1,495 |
| Total..... | <u>7,750</u> |
| Las Animas, repairs..... | |
| | 6 |
| Magdalena: | |
| 2 cabins, at \$550..... | 1,100 |
| 2 barns, at \$100..... | 200 |
| 5 miles pasture fence, at \$120.60..... | 603 |
| Total..... | <u>1,903</u> |

Manzano:

| | |
|--|---------------|
| 4 cabins, at \$500..... | \$2, 000 |
| 4 barns, at \$75..... | 300 |
| 8 miles pasture fence, at \$125..... | 1, 000 |
| 18 miles drift fence, at \$132.61..... | 2, 387 |
| Total..... | 5, 687 |

Mount Taylor:

| | |
|---------------------------------------|---------------|
| 1 cabin..... | 500 |
| 1 barn..... | 75 |
| 1 mile pasture fence..... | 125 |
| 5 miles drift fence, at \$134.40..... | 672 |
| Total..... | 1, 372 |

Pecos:

| | |
|--|---------------|
| 3 cabins, at \$500..... | 1, 500 |
| 3 barns, at \$75..... | 225 |
| 6 miles pasture fence, at \$125..... | 750 |
| 16 miles drift fence, at \$125..... | 2, 000 |
| 20 miles telephone line, at \$42.60..... | 852 |
| Total..... | 5, 327 |

Peloncillo:

| | |
|--|---------------|
| 1 cabin..... | 450 |
| 1 barn..... | 75 |
| 2 miles pasture fence, at \$125..... | 250 |
| 12 miles drift fence, at \$119.67..... | 1, 437 |
| Total..... | 2, 212 |

Sacramento:

| | |
|--|----------------|
| 3 cabins, at \$500..... | 1, 500 |
| 3 barns, at \$75..... | 225 |
| 3 miles pasture fence, at \$125..... | 375 |
| Driven well..... | 1, 000 |
| Tank and dam..... | 1, 100 |
| 40 miles drift fence, at \$100..... | 4, 000 |
| 50 miles telephone line, at \$54.06..... | 2, 703 |
| Total..... | 10, 903 |

San Mateo:

| | |
|--|---------------|
| 2 cabins, at \$500..... | 1, 000 |
| 2 barns, at \$75..... | 150 |
| 4 miles pasture fence, at \$62.50..... | 250 |
| 40 miles trail, at \$50..... | 2, 000 |
| 15 miles drift fence, at \$123.54..... | 1, 853 |
| Total..... | 5, 253 |

Taos:

| | |
|--------------------------------------|---------------|
| 1 cabin..... | 500 |
| 1 barn..... | 100 |
| 2 miles pasture fence, at \$125..... | 250 |
| Repairing roads and trails..... | 200 |
| 15 miles drift fence, at \$122..... | 1, 830 |
| Total..... | 2, 880 |

OKLAHOMA.*Summary.*

| | |
|----------------------|------------|
| Wichita..... | \$751 |
| Contingent fund..... | 150 |
| Total..... | 901 |

Detailed estimates.

| | |
|--|------------|
| Wichita: | |
| 1 cabin..... | \$500 |
| 1 barn..... | 75 |
| 1½ miles pasture fence, at \$117.33..... | 176 |
| Total..... | <u>751</u> |

OREGON.

Summary by forests.

| | | | |
|---------------------|----------|----------------|-----------|
| Ashland..... | \$2, 138 | Imnaha..... | \$21, 631 |
| Blue Mountains..... | 44, 545 | Siskiyou..... | 14, 003 |
| Bull Run..... | 1, 755 | Tillamook..... | 2, 176 |
| Cascade..... | 72, 763 | Umpqua..... | 9, 864 |
| Coquille..... | 1, 829 | Wenaha..... | 6, 118 |
| Fremont..... | 15, 277 | | |
| Goose Lake..... | 7, 787 | Total..... | 203, 495 |
| Heppner..... | 3, 609 | | |

Detailed estimates by forests.

| | |
|---|----------------|
| Ashland: | |
| 1 cabin..... | \$500 |
| 1 barn..... | 100 |
| 2 miles pasture fence, at \$125..... | 250 |
| 25 miles trail, at \$51.52..... | 1, 288 |
| Total..... | <u>2, 138</u> |
| Blue Mountains: | |
| 160 miles telephone line, at \$75..... | 12, 000 |
| 320 miles trails, at \$75..... | 24, 000 |
| 8 cabins, at \$500..... | 4, 000 |
| 8 barns, at \$75..... | 600 |
| 10 miles pasture fence, at \$125..... | 1, 250 |
| Repairing 110 miles trail, at \$10..... | 1, 100 |
| Repairing 25 miles road, at \$50..... | 1, 250 |
| 5 bridges, at \$69..... | 345 |
| Total..... | <u>44, 545</u> |
| Bull Run: | |
| 30 miles new trail, at \$50..... | 1, 500 |
| Repairs to old trail..... | 255 |
| Total..... | <u>1, 755</u> |
| Cascade: | |
| 500 miles trails, at \$50..... | 25, 000 |
| 100 miles trails, at \$75..... | 7, 500 |
| 100 miles trails, at \$100..... | 10, 000 |
| 150 miles telephone lines, at \$60..... | 9, 000 |
| 20 cabins, at \$500..... | 10, 000 |
| 20 barns, at \$75..... | 1, 500 |
| 30 miles pasture fence, at \$125..... | 3, 750 |
| 10 miles fire line, at \$300..... | 3, 000 |
| 1 bridge..... | 400 |
| 6 bridges, at \$225..... | 1, 350 |
| 3 miles road, at \$300..... | 900 |
| Repairs to old trails..... | 363 |
| Total..... | <u>72, 763</u> |
| Coquille: | |
| 1 cabin..... | 500 |
| 1 barn..... | 75 |
| 2 miles pasture fence, at \$125..... | 250 |
| 20 miles trails, at \$50.20..... | 1, 004 |
| Total..... | <u>1, 829</u> |

Fremont:

| | |
|--|---------------|
| 20 miles wagon road, at \$400..... | \$8,000 |
| 6 cabins, at \$550..... | 3,300 |
| 6 barns, at \$75..... | 450 |
| 8 miles pasture fence, at \$125..... | 1,000 |
| 48 miles telephone line, at \$52.65..... | 2,527 |
| Total..... | <u>15,277</u> |

Goose Lake:

| | |
|--|--------------|
| 50 miles trails, at \$50..... | 2,500 |
| 4 cabins, at \$500..... | 2,000 |
| 4 barns, at \$75..... | 300 |
| 6 miles pasture fence, at \$125..... | 750 |
| 3 miles road, at \$300..... | 900 |
| 25 miles telephone line, at \$53.45..... | 1,337 |
| Total..... | <u>7,787</u> |

Heppner:

| | |
|---------------------------------------|--------------|
| 2 cabins, at \$500..... | 1,000 |
| 2 barns, at \$75..... | 150 |
| 4 miles pasture fence, at \$125..... | 500 |
| 20 miles telephone line, at \$60..... | 1,200 |
| 16 miles trails, at \$47.44..... | 759 |
| Total..... | <u>3,609</u> |

Imnaha:

| | |
|---|---------------|
| 140 miles trails, at \$75..... | 10,500 |
| 100 miles telephone lines, at \$60..... | 6,000 |
| 6 cabins, at \$550..... | 3,300 |
| 6 barns, at \$75..... | 450 |
| 8 miles pasture fence, at \$125..... | 1,000 |
| Repairs to trails and cabin..... | 381 |
| Total..... | <u>21,631</u> |

Siskiyou:

| | |
|--|---------------|
| 35 miles Rogue River trail and road, at \$200..... | 7,000 |
| 30 miles telephone line, at \$58.33..... | 1,750 |
| 4 cabins, at \$500..... | 2,000 |
| 4 barns, at \$75..... | 300 |
| 4 miles pasture fence, at \$125..... | 500 |
| 50 miles trails, at \$49.06..... | 2,453 |
| Total..... | <u>14,003</u> |

Tillamook:

| | |
|----------------------------------|--------------|
| 1 cabin..... | 500 |
| 1 barn..... | 75 |
| 1 mile pasture fence..... | 125 |
| 30 miles trails, at \$49.20..... | 1,476 |
| Total..... | <u>2,176</u> |

Umpqua:

| | |
|---------------------------------------|--------------|
| 4 cabins, at \$500..... | 2,000 |
| 4 barns, at \$75..... | 300 |
| 4 miles pasture fence, at \$125..... | 500 |
| 30 miles telephone line, at \$60..... | 1,800 |
| 10 miles drift fence, at \$125..... | 1,250 |
| 80 miles trails, at \$50.17..... | 4,014 |
| Total..... | <u>9,864</u> |

Wenaha:

| | |
|---|--------------|
| 55 miles telephone line, at \$60..... | \$3,300 |
| 4 cabins, at \$500..... | 2,000 |
| 4 barns, at \$75..... | 300 |
| 4 miles pasture fence, at \$129.50..... | 513 |
| Total..... | 6,113 |

SOUTH DAKOTA.*Summary by forests.*

| | | | |
|-------------------------|-----------------|-----------------------------|----------------|
| Black Hills..... | \$14,378 | Contingent fund..... | \$2,500 |
| Cave Hills..... | 286 | | |
| Short Pine..... | 234 | Total..... | 18,119 |
| Slim Buttes..... | 721 | | |

*Detailed estimates by forests.***Black Hills:**

| | |
|--|---------------|
| 8 cabins, at \$550..... | \$4,400 |
| 8 barns, at \$100..... | 800 |
| 10 miles pasture fence, at \$125..... | 1,250 |
| 75 miles telephone line, at \$60..... | 4,500 |
| 3 bridges, at \$200..... | 600 |
| Cleaning out and repairing old roads..... | 600 |
| 3 miles fire line, at \$300..... | 900 |
| 10 miles boundary fences, at \$132.80..... | 1,328 |
| Total..... | 14,378 |

| | |
|---------------------------------|-----|
| Cave Hills, cabin..... | 286 |
| Short Pine, barn and fence..... | 234 |

Slim Buttes:

| | |
|--------------------|------------|
| Cabin..... | 450 |
| Barn..... | 75 |
| Pasture fence..... | 196 |
| Total..... | 721 |

UTAH.*Summary by forests.*

| | | | |
|-------------------------|----------------|-----------------------------|----------------|
| Aquarius..... | \$8,973 | Payson..... | \$2,064 |
| Bear River..... | 3,312 | Raft River..... | 1,446 |
| Beaver..... | 3,547 | Salt Lake..... | 1,174 |
| Dixie..... | 5,760 | Sevier..... | 8,788 |
| Fillmore..... | 4,944 | Uinta..... | 27,044 |
| Fish Lake..... | 4,487 | Vernon..... | 852 |
| Glenwood..... | 2,151 | Wasatch..... | 1,050 |
| Grantsville..... | 853 | Contingent fund..... | 16,000 |
| La Sal..... | 1,594 | | |
| Manti..... | 9,715 | Total..... | 107,660 |
| Monticello..... | 3,906 | | |

*Detailed estimates by forests.***Aquarius:**

| | |
|--|--------------|
| 3 cabins, at \$500..... | \$1,500 |
| 2 barns, at \$75..... | 150 |
| 6 miles pasture fence, at \$125..... | 750 |
| 24 miles drift fence, at \$125..... | 3,000 |
| 55 miles telephone line, at \$55.54..... | 3,000 |
| Repairing roads and cabins..... | 573 |
| Total..... | 8,973 |

Bear River:

| | |
|--|---------------|
| 3 cabins, at \$500..... | \$1, 500 |
| 3 barns, at \$75..... | 225 |
| 7 miles pasture fence, at \$125..... | 875 |
| 15 miles telephone line, at \$47.46..... | 712 |
| Total..... | <u>3, 312</u> |

Beaver:

| | |
|--|---------------|
| 2 cabins, at \$500..... | 1, 000 |
| 2 barns, at \$75..... | 150 |
| 6 miles pasture fence, at \$125..... | 750 |
| Repairing roads and cabins..... | 247 |
| 11 miles drift fence, at \$127.30..... | 1,400 |
| Total..... | <u>3, 547</u> |

Dixie:

| | |
|--|---------------|
| 4 cabins, at \$500..... | 2, 000 |
| 4 barns, at \$75..... | 300 |
| 6 miles pasture fence, at \$125..... | 750 |
| 16 miles drift fence, at \$125..... | 2, 000 |
| 15 miles telephone line, at \$47.45..... | 710 |
| Total..... | <u>5, 760</u> |

Fillmore:

| | |
|--------------------------------------|---------------|
| 2 cabins, at \$500..... | 1, 000 |
| 2 barns, at \$75..... | 150 |
| 6 miles pasture fence, at \$125..... | 750 |
| 20 miles drift fence, at \$125..... | 2, 500 |
| Repairs to roads and cabins..... | 544 |
| Total..... | <u>4, 944</u> |

Fish Lake:

| | |
|--|---------------|
| 2 cabins, at \$550..... | 1, 100 |
| 2 barns, at \$100..... | 200 |
| 6 miles pasture fence, at \$125..... | 750 |
| 4 miles roads, at \$300..... | 1, 200 |
| 2 bridges, at \$105..... | 210 |
| 20 miles telephone line, at \$51.35..... | 1, 027 |
| Total..... | <u>4, 487</u> |

Glenwood:

| | |
|---------------------------------------|---------------|
| 2 cabins, at \$500..... | 1, 000 |
| 2 barns, at \$100..... | 200 |
| 4 miles pasture fence, at \$125..... | 500 |
| 4 miles drift fence, at \$112.75..... | 451 |
| Total..... | <u>2, 151</u> |

Grantsville:

| | |
|---|------------|
| Cabin..... | 500 |
| Barn..... | 100 |
| 2 miles pasture fence, at \$126.50..... | 253 |
| Total..... | <u>853</u> |

La Sal:

| | |
|---------------------------------------|---------------|
| Cabin..... | 500 |
| Barn..... | 75 |
| 2 miles pasture fence, at \$125..... | 250 |
| 6 miles drift fence, at \$128.16..... | 769 |
| Total..... | <u>1, 594</u> |

Manti:

| | |
|---|---------|
| 4 cabins, at \$550..... | \$2,200 |
| 4 barns, at \$100..... | 400 |
| 8 miles pasture fence, at \$125..... | 1,000 |
| 58 miles telephone lines, at \$54.20..... | 3,200 |
| 20 miles drift fence, at \$125..... | 2,500 |
| 1 mile road and repairs..... | 415 |
| Total..... | 9,715 |

Monticello:

| | |
|--------------------------------------|-------|
| 2 cabins, at \$550..... | 1,100 |
| 2 barns, at \$75..... | 150 |
| 8 miles pasture fence, at \$125..... | 1,000 |
| Repairs to cabin..... | 156 |
| 12 miles drift fence, at \$125..... | 1,500 |
| Total..... | 3,906 |

Payson:

| | |
|--|-------|
| 2 cabins, at \$500..... | 1,000 |
| 2 barns, at \$75..... | 150 |
| 4 miles pasture fence, at \$125..... | 500 |
| 3½ miles drift fence, at \$118.30..... | 414 |
| Total..... | 2,064 |

Raft River:

| | |
|--|-------|
| Cabin..... | 500 |
| Barn..... | 100 |
| 2 miles pasture fence, at \$125..... | 250 |
| 4½ miles drift fence, at \$132.50..... | 596 |
| Total..... | 1,446 |

Salt Lake:

| | |
|--------------------------------------|-------|
| 20 miles trails, at \$30..... | 600 |
| 3 miles fire lines, at \$191.30..... | 574 |
| Total..... | 1,174 |

Sevier:

| | |
|---------------------------------------|-------|
| 3 cabins, at \$500..... | 1,500 |
| 3 barns, at \$75..... | 225 |
| 6 miles pasture fence, at \$125..... | 750 |
| 40 miles telephone line, at \$55..... | 2,200 |
| 20 miles drift fence, at \$125..... | 2,500 |
| 5 miles road, at \$322.60..... | 1,613 |
| Total..... | 8,788 |

Uinta:

| | |
|--|--------|
| 120 miles telephone line, at \$75..... | 9,000 |
| 50 miles boundary fence, at \$125..... | 6,250 |
| 8 cabins, at \$600..... | 4,800 |
| 8 barns, at \$100..... | 800 |
| 12 miles pasture fence, at \$125..... | 1,500 |
| 30 miles trails, at \$53.33..... | 1,600 |
| 12 miles drift fence, at \$125..... | 1,500 |
| 6 miles road, at \$200..... | 1,200 |
| Repairing cabin..... | 394 |
| Total..... | 27,044 |

Vernon:

| | |
|---|-----|
| 1 cabin..... | 500 |
| 1 barn..... | 75 |
| 2 miles pasture fence, at \$138.50..... | 277 |
| Total..... | 852 |

Wasatch:

| | |
|--------------------------------------|-------|
| 10 miles trails, at \$30..... | \$300 |
| Addition to cabin..... | 250 |
| 2 miles pasture fence, at \$125..... | 250 |
| 2 miles drift fence, at \$125..... | 250 |
| Total..... | 1,050 |

WASHINGTON.

Summary by forests.

| | | | |
|-------------------|----------|-----------------|----------|
| Colville..... | \$10,747 | Washington..... | \$78,000 |
| Olympic..... | 19,709 | Wenaha..... | 3,935 |
| Priest River..... | 5,025 | | |
| Rainier..... | 31,713 | Total..... | 149,129 |

Detailed estimates by forests.

Colville:

| | |
|---|---------|
| 50 miles telephone line, at \$75..... | \$3,750 |
| 80 miles trails, at \$60..... | 4,800 |
| 3 cabins, at \$500..... | 1,500 |
| 3 barns, at \$100..... | 300 |
| 3 miles pasture fence, at \$132.33..... | 397 |
| Total..... | 10,747 |

Olympic:

| | |
|---|--------|
| Opening and repairing 50 miles old road, at \$50..... | 2,500 |
| 3 bridges, at \$600..... | 1,800 |
| 6 bridges, at \$166.67..... | 1,000 |
| 5 cabins, at \$550..... | 2,750 |
| 5 barns, at \$100..... | 500 |
| 6 miles pasture fence, at \$125..... | 750 |
| 170 miles trails, at \$50..... | 8,500 |
| 35 miles telephone line, at \$54.54..... | 1,909 |
| Total..... | 19,709 |

Priest River:

| | |
|---------------------------------------|-------|
| 2 cabins, at \$500..... | 1,000 |
| 2 barns, at \$75..... | 150 |
| 4 miles pasture fence, at \$125..... | 500 |
| 20 miles telephone line, at \$55..... | 1,100 |
| 45 miles trail, at \$50.55..... | 2,275 |
| Total..... | 5,025 |

Rainier:

| | |
|--------------------------------------|--------|
| 1 bridge..... | 1,250 |
| 200 miles trail, at \$60..... | 12,000 |
| 100 miles trail, at \$90..... | 9,000 |
| 6 cabins, at \$600..... | 3,600 |
| 6 barns, at \$100..... | 600 |
| 8 miles pasture fence, at \$125..... | 1,000 |
| 7 bridges, at \$166.15..... | 1,163 |
| 50 miles telephone, at \$62..... | 3,100 |
| Total..... | 31,713 |

Washington:

| | |
|---------------------------------------|--------|
| 10 miles trail, at \$310..... | 3,100 |
| 100 miles trail, at \$75..... | 7,500 |
| 120 miles trail, at \$60..... | 7,200 |
| 400 miles trail, \$50..... | 20,000 |
| 24 cabins, at \$500..... | 12,000 |
| 24 barns, at \$100..... | 2,400 |
| 30 miles pasture fence, at \$125..... | 3,750 |

Washington—Continued.

| | |
|--|----------|
| 25 miles road, at \$400..... | \$10,000 |
| 10 bridges, at \$150..... | 1,500 |
| 150 miles telephone line, at \$75..... | 9,000 |
| Repairs on 20 miles road, at \$50..... | 1,000 |
| Repairs on cabins and barns..... | 550 |

| | |
|------------|--------|
| Total..... | 78,000 |
|------------|--------|

Wenaha:

| | |
|--|-------|
| 1 cabin..... | 500 |
| 2 miles fence, at \$125..... | 250 |
| 40 miles trails, at \$50..... | 2,000 |
| 25 miles telephone line, at \$47.40..... | 1,185 |

| | |
|------------|-------|
| Total..... | 3,935 |
|------------|-------|

WYOMING.

Summary by forests.

| | | | |
|-------------------|---------|-------------------|---------|
| Bear Lodge..... | \$1,694 | Sierra Madre..... | \$4,585 |
| Big Horn..... | 14,240 | Uinta..... | 50 |
| Black Hills..... | 575 | Yellowstone..... | 82,344 |
| Caribou..... | 100 | | |
| Crow Creek..... | 692 | Total..... | 111,227 |
| Medicine Bow..... | 6,947 | | |

Detailed estimates by forests.

| | |
|---------------------------------------|-------|
| Bear Lodge: | |
| 1 cabin..... | \$550 |
| 1 barn..... | 100 |
| 2 miles pasture fence, at \$125..... | 250 |
| 16 miles telephone line, at \$49..... | 794 |
| Total..... | 1,694 |

Big Horn:

| | |
|---------------------------------------|-------|
| 8 cabins, at \$550..... | 4,400 |
| 8 barns, at \$75..... | 600 |
| 10 miles pasture fence, at \$125..... | 1,250 |
| 60 miles telephone line, at \$60..... | 3,600 |
| 85 miles trails, at \$51.60..... | 4,390 |

| | |
|------------|--------|
| Total..... | 14,240 |
|------------|--------|

| | |
|---|-----|
| Black Hills, barn and fence..... | 575 |
| Caribou, fence..... | 100 |
| Crow Creek, cabin, barn, and fence..... | 692 |

Medicine Bow:

| | |
|---------------------------------------|-------|
| 4 cabins, at \$550..... | 2,200 |
| 4 barns, at \$100..... | 400 |
| 6 miles pasture fence, at \$125..... | 750 |
| 40 miles telephone line, at \$60..... | 2,400 |
| 30 miles trails, at \$39.90..... | 1,197 |

| | |
|------------|-------|
| Total..... | 6,947 |
|------------|-------|

Sierra Madre:

| | |
|--------------------------------------|-------|
| 4 cabins, at \$500..... | 2,000 |
| 4 barns, at \$100..... | 400 |
| 6 miles pasture fence, at \$125..... | 750 |
| 20 miles trails, at \$50..... | 1,000 |
| 3 miles drift fence, at \$145..... | 435 |

| | |
|------------|-------|
| Total..... | 4,585 |
|------------|-------|

| | |
|-------------------|----|
| Uinta, fence..... | 50 |
|-------------------|----|

Yellowstone:

| | |
|--|-----------|
| 240 miles telephone line, at \$60..... | \$14, 400 |
| 160 miles trail, at \$75..... | 12, 000 |
| 400 miles trail, at \$50..... | 20, 000 |
| 100 miles trail, at \$100..... | 10, 000 |
| 30 cabins, at \$500..... | 15, 000 |
| 30 barns, at \$100..... | 3, 000 |
| 40 miles pasture fence, at \$125..... | 5, 000 |
| 24 miles drift fence, at \$123..... | 2, 944 |
| Total..... | 82, 344 |

ALASKA.

Summary by forests.

| | |
|----------------------------|----------|
| Alexander Archipelago..... | \$8, 000 |
| Afognak..... | 4, 000 |
| Chugach..... | 9, 000 |
| Tongass..... | 801 |
| Contingent fund..... | 3, 600 |
| Total..... | 25, 401 |

Detailed estimates.

| | |
|---|----------|
| Alexander Archipelago, Afognak, Chugach, Tongass: | |
| Boats, etc..... | \$3, 801 |
| 50 miles fire line, at \$300..... | 15, 000 |
| 2 cabins, at \$750..... | 1, 500 |
| 2 barns, at \$150..... | 300 |
| 6 miles fence, at \$200..... | 1, 200 |
| Total..... | 21, 801 |

PORTO RICO.

Summary.

| | |
|----------------------|-------|
| Luquillo..... | \$815 |
| Contingent fund..... | 150 |
| Total..... | 965 |

Detailed estimate.

| | |
|---------------------------------------|-------|
| Luquillo, house, barn, and cabin..... | \$815 |
|---------------------------------------|-------|

The CHAIRMAN. You have estimates there calling for this \$2,000,000?

Mr. PINCHOT. I have detailed estimates for every national forest, showing just how it would be spent. I would present these with the statement that they indicate that the service is pretty well aware of the situation and knows what is needed in the different forests.

Mr. POLLARD. That \$2,000,000 you want in the administration of the present forest reserves?

Mr. PINCHOT. Yes; not in the administration, Mr. Pollard, but in making these permanent improvements. I would like to spend that much money in making permanent improvements, if I make that clear.

Mr. POLLARD. How much, may I ask, do you think you ought to have of an increase for this work of cooperation with the private foresters?

Mr. PINCHOT. I think if you will let me treat the forests from the point of view I have suggested I can just about double, or a little less than double, with great advantage, the money spent on that. We

are spending on all kinds of cooperative work and investigation and study of the forests, about \$300,000, or slightly over that.

Mr. POLLARD. Does that relate to the forests that are in the hands of private holders?

Mr. PINCHOT. That relates both to them and to the Government forests; but, of course, where we get information about forests, like this creosoting business, it applies to both. We need an immense amount of detailed information about the situation in the forests, about the use of forest products, the habits and behavior of forest trees with reference to reproduction, and so on, and that is of very great value in connection with our cooperation.

Mr. POLLARD. What would you think of the idea of easing up on this work of studying the methods of trees and seeking new methods of treating the woods and markets, and so on, and the work just described, and of devoting your energies more largely to the dissemination of this information and cooperative work among the private forest companies?

Mr. PINCHOT. I do not believe that you can separate the different parts of the problem. It is all one problem. When we devise methods to make wood last longer, we by that much reduce demands on the present forests. When we get information as to the forests and the best way to handle them, we get what is best for this cooperative work. So I think a rounded scheme that contains both is the wisest thing. I think the cooperative work and the dissemination of information should increase, but we have had to put nearly all our trained men on our national forests in order not to do harm in the cutting.

Mr. POLLARD. On this hypothesis, suppose we should increase your appropriation for this cooperative work and your studies, as you have suggested, by \$300,000 and give you the \$2,000,000. Then, at the end of the year, how much would the Government be out; how much would you expend over and above your receipts for the Forest Service?

Mr. PINCHOT. That is counting the two million and all?

Mr. POLLARD. Yes.

Mr. PINCHOT. It would not miss \$3,000,000 very much.

Mr. POLLARD. That you would expend over and above your receipts?

Mr. PINCHOT. Yes.

The CHAIRMAN. In other words, that would call for a total appropriation of about \$5,000,000, and you expect receipts in the neighborhood of two million?

Mr. PINCHOT. We expect two million returns this year, two millions and a half next year.

Mr. COOK. Do you remember approximately the receipts for last year?

Mr. PINCHOT. One million five hundred and seventy thousand dollars.

Mr. COOK. Just a little less than the expenditures?

Mr. PINCHOT. Just a little more than the expenditures on account of the national forests—\$115,000 I believe.

Mr. McLAUGHLIN. What do you think of this proposition? I have been reading the report of the Secretary of Agriculture on the Appalachian and White mountains proposition, a very interesting and instructive report indeed, and it sets forth there very clearly the

necessity of the Government buying these mountain lands because the State will not do it. Located within the State, for instance, are the mountains and the forests and within those are the sources of some of the rivers that flow into other States, and a large number of other States are interested in the commerce on those rivers; the State having the forest will not go to that immense expense, because it is not directly interested, but the General Government is interested. Would the General Government have authority, under our Constitution and form of government, to impose restrictions upon the State in which those forests are located and upon the individual owners of forests within those States as to the manner in which those forests should be used and cut, and so on? If the interest is national and not confined by State lines, why can not the General Government pass laws restricting the use or prescribing the use?

Mr. PINCHOT. I do not know; I am not a lawyer.

Mr. McLAUGHLIN. Have you taken up that question; have you studied that matter?

Mr. PINCHOT. I have studied the question from this point of view quite thoroughly; that is, would it be possible to get any State, any individual State, to say to a man: "You shall not use that timber land in a particular way, because you hurt your neighbors?"

Mr. McLAUGHLIN. I think that the State has the right. The situation may arise where the State would be justified in saying, "You must use your timber lands so and so."

Mr. PINCHOT. Yes.

Mr. McLAUGHLIN. But can the National Government go into a State and say that the people outside of the State, the people throughout the country, are interested in your river, we will say, and the source of that river must be protected, and we will protect it by a national law?

Mr. PINCHOT. None of the States would admit that; not yet. None of the States would, so far as I know, stand for the Government doing it.

Mr. McLAUGHLIN. Do you not think this cooperative work might very well be extended to suggesting to legislatures the matter of calling the attention of the people and bringing them to the point of passing laws in the State, regulating the use and cutting of forests?

Mr. PINCHOT. We have done a great deal of that. I should say that half of the States have written to the Forest Service asking our advice under the State laws.

Mr. McLAUGHLIN. Are any of the State legislatures acting upon that, with the idea of imposing restrictions upon the cutting of forests?

Mr. PINCHOT. The only State that is taking it up actively is California. I have talked it over with men in other States, but nowhere did I find a state of public sentiment that gave me any hope of having it passed, except in California. But it is sure to come in time. The governor of Louisiana has urged it in his State.

Mr. McLAUGHLIN. Have you ever suggested it in other States?

Mr. PINCHOT. I have not suggested it, but I have talked it over. I think the Service would weaken itself by bringing such a plan forward before public sentiment is educated up to it; the plan was obviously impracticable at the time.

Mr. LEVER. What is the value of the lands in the national reserves now, the entire value?

Mr. PINCHOT. I will give you that.

Mr. McLAUGHLIN. One billion and a half.

Mr. PINCHOT. I can answer Mr. Lever's question quite in detail. The stumpage value of 330,000,000,000 feet of timber at \$2 a thousand feet is \$660,000,000. This was made last year, and I have not brought it up to date, but the bringing of it up to date would probably increase the total value to something near two billion. The main point was that we have estimated the land value at about \$1 an acre.

The CHAIRMAN. Now, Mr. Pinchot, will you proceed, then, with other matters that you want to bring before the committee?

Mr. PINCHOT. Mr. Chairman, there are one or two small matters that I have omitted, and one general matter upon which I want to say a few words, with your permission. In the first place, I want to add, as to the methods of accounting in the Forest Service, that in addition to this statement which I show you, showing the monthly balance, and the fact that we can give you, at any time, the exact statement of money received, we have a careful system of cost keeping. I ought to have said to you that the total receipts from July 1 to the close of business yesterday were \$552,945.17. I bring that in in order to show that day by day we know where we stand.

The CHAIRMAN. Was that the total receipts from the time the forest reserves were first established?

Mr. PINCHOT. That is from July 1, 1907, seven months.

Mr. POLLARD. Did that relate wholly to the current year's business?

Mr. PINCHOT. To the current year's business; yes, sir.

Mr. McLAUGHLIN. Please repeat that.

Mr. PINCHOT. The total receipts from July 1, 1907, last summer, to December 31, 1907, were \$513,427.25.

The CHAIRMAN. I thought you said five million.

Mr. PINCHOT. I beg your pardon if I did. The total receipts for the corresponding period last year were \$357,506.97, an increase of nearly \$200,000 for the present year over the last.

Mr. POLLARD. That is for the last seven months?

Mr. PINCHOT. For the six months.

Mr. POLLARD. Of the preceding year?

Mr. PINCHOT. For the last six months of 1907. I will submit the statement in full:

| | | |
|---|--------------|--------------|
| Total receipts July 1, 1907, to December 31, 1907: | | |
| Timber sales..... | \$465,465.11 | |
| Grazing..... | 37,210.37 | |
| Special uses..... | 10,751.77 | |
| | | \$513,427.25 |
| Total receipts January 2, 1908, to January 20, 1908: | | |
| Timber sales..... | 24,614.36 | |
| Grazing..... | 3,191.27 | |
| Special uses..... | 10,229.70 | |
| | | 38,035.33 |
| Total receipts January 21, 1908..... | | 1,482.59 |
| Total receipts July 1, 1907, to January 21, 1908..... | | 552,945.17 |
| Total receipts July 1, 1906, to December 31, 1906: | | |
| Timber sales..... | 311,707.26 | |
| Grazing..... | 38,175.70 | |
| Special uses..... | 7,624.01 | |
| | | 357,506.97 |

So you see that down to the close of business yesterday the total receipts for the seven months are \$552,945.17.

Mr. McLAUGHLIN. The increase during the corresponding period of last year was how much?

Mr. PINCHOT. The increase during the last six months of last year was about \$165,000.

Mr. McLAUGHLIN. More than the seven months of the year?

Mr. PINCHOT. No; the increase for the six months of this year over the six months of last year was about one hundred and sixty-seven thousand, and the total up to the end of business yesterday was something over half a million.

Mr. POLLARD. Do the receipts average about the same for all the months of the year, or are there certain months when they are very different?

Mr. PINCHOT. They are different.

Mr. POLLARD. When are they different?

Mr. PINCHOT. In the spring when the grazing receipts come in.

Mr. POLLARD. Then this report does not include the months when the receipts are heaviest?

Mr. PINCHOT. No; during the five months we will get about \$1,500,000 more, so the total receipts this year are estimated at about two million.

Our cost-keeping statement, which is made quarterly, shows exactly what each project under the Forest Service costs both in our funds and in the cooperative funds. We are endeavoring, by means of this cost-keeping statement, to secure standards of cost of different kinds of work, so that we shall be able to check up ultimately each man and each branch, and find out whether he is making a particular kind of work cost more than it ought to. We find it very essential to prepare standards of that kind.

I should like to speak also of our Forest Service system of efficiency reports. Every Tuesday I receive from the four branches under which, as you will remember, are grouped the various subdivisions of the Service organization, a tabulated statement which enables me to see at a glance exactly what is the state of the work in every part of the Service. By fixing a definite and I think a pretty rigorous time schedule within which the various kinds of duties must be performed or else entered as delinquent, if the machine does not keep right up to its work I find it out. That you may see just how the system works, I am going to ask that the efficiency reports for last week (and I assure you that they are taken simply because they are the most recent reports that I have received and were made up with no thought of any such use as this) may be made a part of the record.

EFFICIENCY REPORT, WEEK ENDING JANUARY 18, 1908.

BRANCH OF GRAZING.

Correspondence and Reports

| Time
limit. | Class of work. | Final action within— | | | |
|-------------------------------|--|----------------------|-----------------|------------------|------------------|
| | | 2 days. | 3 to 5
days. | 5 to 10
days. | Over
10 days. |
| OFFICE OF THE CHIEF. | | | | | |
| Days. | | | | | |
| 2 | "Special" letters..... | 31 | | | |
| 5 | General correspondence..... | 1 | | | |
| 5 | Inspector's reports; instructions to field officers..... | 3 | | 1 | |
| OFFICE OF CONTROL. | | | | | |
| 2 | "Special" letters..... | 7 | | | |
| 5 | General correspondence..... | 18 | 2 | | |
| 1 | Action on accounts..... | | | | |
| 2 | Requests for refunds..... | 2 | | | |
| 2 | Trespass cases..... | 9 | | | |
| 5 | When referred to law..... | 3 | | | |
| OFFICE OF DEVELOPMENT. | | | | | |
| 2 | "Special" letters..... | 5 | | | |
| 5 | General correspondence..... | 2 | | | |
| 2 | Application for regulation; 58 permits..... | 1 | | | |
| 10 | When referred to status..... | | | | |
| 5 | Special uses..... | 59 | | | |
| 2 | Forage..... | | | | |

a "Special" letters—Administrative, important and referred. General correspondence—General and routine letters not showing any necessity for an immediate reply. Time shown, difference between date of receiving stamp and date of reply or final action.

BRANCH OF OPERATION.

OFFICE OF MAINTENANCE.

PURCHASE.

Status of requisitions.

| | |
|----------------------------------|----|
| Stock requisitions received..... | 63 |
| Stock requisitions filled..... | 61 |
| Stock requisitions canceled..... | 2 |
| Promises due: | |
| Kept..... | 0 |
| Not kept at time promised..... | 0 |

SUPPLIES.

Status of requisitions.

| | Filled. | | | | |
|--------------------------------------|-----------|---------|----------|------------------|---------|
| | 3 days. | 6 days. | 14 days. | 30 days or more. | Total. |
| Instruments and field equipment..... | 21 | 2 | 9 | 49 | 81 |
| Office equipment..... | 8 | 4 | 17 | 46 | 75 |
| Stationery and forms..... | 168 | 55 | 50 | 46 | 319 |
| Total..... | 197 | 61 | 76 | 141 | 475 |
| | Unfilled. | | | | |
| | 3 days. | 6 days. | 14 days. | 30 days or more. | Total. |
| Instruments and field equipment..... | 19 | 2 | 28 | 56 | 105 a19 |
| Office equipment..... | 13 | 15 | 34 | 43 | 115 a40 |
| Stationery and forms..... | 34 | 7 | 39 | 27 | 107 a3 |
| Total..... | 66 | 24 | 101 | 126 | 327 a62 |

a Requisitions for standard articles.

| | |
|--------------------------------|---|
| Promises due: | |
| Kept..... | 2 |
| Not kept at time promised..... | 0 |

Efficiency report, week ending January 18, 1908—Continued.

BRANCH OF OPERATION—Continued.

OFFICE OF MAINTENANCE—Continued.

PHOTOGRAPHY.

Status of requisitions.

| Class of work. | Filled. | | | | | Total. |
|---------------------------|--------------|--------------|---------------|---------------------|---------------|--------|
| | 1 to 3 days. | 3 to 6 days. | 1 to 2 weeks. | 2 weeks to 1 month. | Over 1 month. | |
| Maps: | | | | | | |
| Negatives..... | 1 | 2 | 3 | | | 6 |
| Prints..... | 6 | 2 | 4 | | | 12 |
| Mounting..... | 16 | | | | | 16 |
| Blueprints..... | 15 | | | | | 15 |
| Transparencies..... | 1 | | | | | 1 |
| Bromide enlargements..... | | 2 | | | | 2 |
| Bromide bleaching..... | | | | | | |
| Lantern slides..... | | 1 | | | | 1 |
| Photo prints..... | 7 | 5 | 3 | | | 15 |
| Print mounting..... | 1 | 1 | 1 | | 6 | 8 |
| Copying..... | 1 | 1 | 1 | | | 3 |
| Developing..... | | 5 | | 4 | | 9 |
| Lithographs..... | | 3 | 1 | | | 4 |
| Films..... | | | | | | |

| Class of work. | Unfilled. | | | | | Total. |
|---------------------------|--------------|--------------|---------------|---------------------|---------------|--------|
| | 1 to 3 days. | 3 to 6 days. | 1 to 2 weeks. | 2 weeks to 1 month. | Over 1 month. | |
| Maps: | | | | | | |
| Negatives..... | 2 | 3 | | | | 5 |
| Prints..... | 10 | 6 | | | | 16 |
| Mounting..... | 3 | | | | | 3 |
| Blueprints..... | 5 | | | | | 5 |
| Transparencies..... | | | | | 1 | 1 |
| Bromide enlargements..... | | 3 | 1 | | 1 | 5 |
| Bromide bleaching..... | | | | | | |
| Lantern slides..... | 2 | | a 4 | a 2 | a 1 | 10 |
| Photo prints..... | 2 | 2 | b 9 | 1 | | 14 |
| Print mounting..... | | | | | | |
| Copying..... | | | | | | |
| Developing..... | | | | | | |
| Lithographs..... | | 1 | | | | 1 |
| Films..... | | | | | | |

a Lantern slides sold for which payment has not been received.

b Two of these requisitions were for photo prints sold for which payment has not been received.

| | |
|--------------------------------|---|
| Promises due: | |
| Kept..... | 0 |
| Not kept at time promised..... | 0 |

PROPERTY AUDITING.

| | |
|--------------------------------|---|
| Promises due: | |
| Kept..... | 0 |
| Not kept at time promised..... | 0 |

STENOGRAPHY AND TYPEWRITING.

Status of requisitions.

| Class of work. | Filled—Action taken in— | | | | | |
|--------------------------|-------------------------|--------------|--------------|---------------|---------------------|---------------|
| | 1 day. | 2 to 3 days. | 4 to 6 days. | 1 to 2 weeks. | 2 weeks to 1 month. | Over 1 month. |
| General typewriting..... | 21 | 11 | 7 | 7 | 1 | |
| Mimeographing..... | 16 | 2 | 2 | | | |
| Details..... | 9 | | | | | |

| Class of work. | Unfilled—Action taken in— | | | | | |
|--------------------------|---------------------------|--------------|--------------|---------------|---------------------|---------------|
| | 1 day. | 2 to 3 days. | 4 to 6 days. | 1 to 2 weeks. | 2 weeks to 1 month. | Over 1 month. |
| General typewriting..... | 2 | 3 | 8 | 3 | | |
| Mimeographing..... | 2 | 7 | 3 | 1 | | |
| Details..... | | | | | | |

| | |
|--------------------------------|-----|
| Promises due: | |
| Kept..... | 127 |
| Not kept at time promised..... | 0 |

Efficiency report, week ending January 18, 1908—Continued.

BRANCH OF OPERATION—Continued.

OFFICE OF ACCOUNTS.

| Class of work. | Time limit. | Action | |
|-----------------------------|--------------|--------------------|------------------------|
| | | Within time limit. | Not within time limit. |
| Reimbursement vouchers..... | 12 days..... | 43 | 17 |
| Service vouchers..... | 6 days..... | 395 | 35 |
| Purchase vouchers..... | 15 days..... | 502 | 74 |
| Salary vouchers..... | 4 days..... | 10 | |
| Field pay rolls..... | do..... | 653 | |

Promises due:

| | |
|--------------------------------|---|
| Kept..... | 0 |
| Not kept at time promised..... | 0 |

OFFICE OF ORGANIZATION.

Correspondence and Reports.

| Time limit. | Class of work. | Action taken in— | | | | | Overdue not answered. |
|---------------|--|------------------|---------|---------|---------------|---------------|-----------------------|
| | | 36 hours. | 3 days. | 4 days. | 5 to 10 days. | Over 10 days. | |
| 36 hours..... | 1. "Special" letters..... | 54 | | | 2 | | |
| 3 days..... | 2. General correspondence answered in office of chief..... | | | | | | |
| 4 days..... | 3. General correspondence requiring attention of district foresters..... | | | | | | |
| 5 days..... | 4. Inspection letters and reports..... | 57 | 23 | 10 | 10 | | a 5 |
| | | 3 | 6 | 5 | 8 | 1 | b 5 |

a One held for letter from War Department.

b Two referred to the Associate Forester and 1 to the Forester.

Promises due:

| | |
|---------------|---|
| Kept..... | 8 |
| Not kept..... | 0 |

OFFICE OF ENGINEERING.

Correspondence and Estimates.

| Time limit. | Class of work. | Action taken in— | | | | | Overdue, not answered. |
|---------------|--|------------------|---------|---------|---------------|---------------|------------------------|
| | | 36 hours. | 3 days. | 4 days. | 5 to 10 days. | Over 10 days. | |
| | <i>Correspondence.</i> | | | | | | |
| 36 hours..... | 1. "Special" letters..... | 16 | | | | | |
| 4 days..... | 2. Letters regarding cooperative improvement work..... | 2 | | | | | |
| 5 days..... | 3. Inspection letters and reports..... | | | | | | |
| 3 days..... | 4. Miscellaneous..... | 91 | | | | | |
| | <i>Estimates.</i> | | | | | | |
| 3 days..... | 1. Permanent improvement work except (2)..... | 27 | | | | | |
| 4 days..... | 2. Cabin and pasture construction..... | 28 | | | | | |

Promises due:

| | |
|---------------|---|
| Kept..... | 0 |
| Not kept..... | 0 |

AGRICULTURAL APPROPRIATION BILL.

Efficiency report, week ending January 18, 1908—Continued.

BRANCH OF OPERATION—Continued.

OFFICE OF LANDS.

OFFICE OF CHIEF.

Correspondence and Reports.

| Time limit. | Class of work. | Action taken in— | | | | | Overdue,
not an-
swered. |
|---------------|---|------------------|---------|-----------------|------------------|------------------|--------------------------------|
| | | 36 hours. | 3 days. | 4 to 5
days. | 5 to 10
days. | Over 10
days. | |
| 36 hours..... | 1. "Special" letters..... | | | | | | |
| 3 days..... | 2. General correspondence..... | | | | | | |
| 5 days..... | 3. Inspection letters and re-
ports..... | | | | | | |
| Promises due: | | | | | | | |
| Kept..... | | | | | | | 0 |
| Not kept..... | | | | | | | 0 |

BOUNDARIES.

Correspondence and Reports.

| Time Limit. | Class of work. | Action taken in— | | | | | | | Overdue: not answered. |
|---------------|--|------------------|---------|---------|--------------|---------|---------------|---------------|------------------------|
| | | 36 hours. | 2 days. | 3 days. | 4 to 5 days. | 6 days. | 7 to 10 days. | Over 10 days. | |
| | <i>Correspondence.</i> | | | | | | | | |
| 36 hours..... | 1. "Special" letters..... | 13 | | 2 | 1 | | | | |
| 3 days..... | 2. General correspondence. | 34 | 10 | 4 | 3 | | 1 | | |
| 5 days..... | 3. Inspection letters and reports. | 9 | 2 | 2 | 3 | | | | |
| | <i>Reports.</i> | | | | | | | | |
| 2 days..... | I. Action on reports upon proposed Forests, additions to and eliminations from existing Forests. | 3 | | | | | | | |
| | II. Withdrawal of sites for administrative purposes: | | | | | | | | |
| 5 days..... | a. Sending to Department of Interior for withdrawal of lands, or returning report to examiner for amendment. | 16 | | 17 | 13 | 1 | 5 | | |
| 2 days..... | b. Action after notice of withdrawal is received from Department of Interior. | 52 | 3 | 3 | | | | | |
| | III. Requests for status of lands: | | | | | | | | |
| 2 days..... | a. For 1 section or less. | 1 | | | | | | | |
| 6 days..... | b. For over 1 section. | | | | | | | | |
| Promises due: | | | | | | | | | |
| Kept..... | | | | | | | | | |
| Not kept..... | | | | | | | | | |

Efficiency report, week ending January 18, 1908—Continued.

BRANCH OF OPERATION—Continued.

OFFICE OF LANDS—Continued.

SPECIAL USES.

Correspondence, Permits, and Reports.

| Time limit. | Class of work. | Action taken in— | | | | Overdue not answered. |
|-----------------------|---|------------------|--------------|---------------|---------------|-----------------------|
| | | 36 hours. | 3 to 5 days. | 6 to 10 days. | Over 10 days. | |
| | <i>Correspondence.</i> | | | | | |
| 36 hours.... | 1. "Special" letters..... | 7 | | | | |
| 3 days..... | 2. General correspondence..... | 40 | | 10 | | 1 |
| 5 days..... | 3. Inspection letters and reports..... | | | | | |
| | <i>Permits.</i> | | | | | |
| | I. Forester's permits: | | | | | |
| 5 days..... | a. Received from supervisors with reports..... | | | | | |
| 2 days..... | b. Action on executed agreements..... | 1 | 1 | | | |
| 5 days..... | II. Supervisors' permits..... | 11 | 34 | | | |
| | <i>Reports.</i> | | | | | |
| 5 days..... | Supervisors' reports on trespass..... | | | | | |
| | <i>Rights of way.</i> | | | | | |
| 2 days..... | Interior Department rights of way: | | | | | |
| | a. Applications received from General Land Office for report..... | 3 | 1 | | | |
| 5 days..... | b. Reports from supervisors..... | | | | | |
| 2 days..... | c. Action on executed stipulations..... | | | | | |
| * Can not be located. | | | | | | |
| Promises due: | | | | | | |
| Kept..... | | | | | | 1 |
| Not kept..... | | | | | | 0 |

SETTLEMENT.

Correspondence, Applications, and Reports.

| Time limit. | Class of work. | Action taken in— | | | | | Overdue, not answered. |
|---------------------|---|------------------|---------|--------------|---------------|---------------|------------------------|
| | | 36 hours. | 3 days. | 4 to 5 days. | 6 to 10 days. | Over 10 days. | |
| | <i>Correspondence.</i> | | | | | | |
| 36 hours.... | 1. "Special" letters..... | 3 | 1 | | | | |
| 3 days..... | 2. General correspondence..... | 21 | 9 | 7 | 2 | | 1 |
| 5 days..... | 3. Inspection letters and reports..... | 13 | | 2 | | | |
| | <i>Applications.</i> | | | | | | |
| 5 days..... | Preliminary action on application for lands under act of June 11, 1906..... | 37 | 10 | 31 | 50 | | |
| | <i>Reports.</i> | | | | | | |
| 10 days..... | Action on reports upon examination of lands..... | 40 | 11 | 63 | 64 | 60 | |
| * Can not be found. | | | | | | | |
| Promises due: | | | | | | | |
| Kept..... | | | | | | | 0 |
| Not kept..... | | | | | | | 1 |

Efficiency report, week ending January 18, 1908—Continued.

BRANCH OF OPERATION—Continued.

OFFICE OF LANDS—Continued.

CLAIMS.

Correspondence and Reports.

| Time limit. | Class of work. | Action taken in— | | | | | Overdue,
not answered. |
|-------------|------------------------------------|------------------|---------|--------------|---------------|---------------|---------------------------|
| | | 36 hours. | 3 days. | 4 to 5 days. | 6 to 10 days. | Over 10 days. | |
| | <i>Correspondence.</i> | | | | | | |
| 36 hours | 1. "Special" letters. | 9 | | | | | |
| 3 days | 2. General correspondence. | 59 | 40 | 19 | 7 | 2 | 8 |
| 5 days | 3. Inspection letters and reports. | | | | | | |
| | <i>Reports.</i> | | | | | | |
| 5 days | Action on reports upon claims. | 75 | 23 | 35 | 14 | | 12 |

c) Of the 12 5-day reports, 1 is with examiner, 8 in typewriting section, and 3 can not be found. Of the 8 general correspondence, 1 is with examiner, 2 awaits status, 1 is in typewriting section, and 4 can not be found.

Promises due:

| | |
|---------------|---|
| Kept..... | 1 |
| Not kept..... | 0 |

STATUS.

Reports on Title.

| Time limit. | Class of work. | Action taken in— | | | | | | | Overdue, not answered. |
|-------------|--------------------------------------|------------------|---------|---------|--------------|---------|---------------|---------------|------------------------|
| | | 36 hours. | 2 days. | 3 days. | 4 to 5 days. | 6 days. | 7 to 10 days. | Over 10 days. | |
| | <i>Requests for status of lands.</i> | | | | | | | | |
| 2 days..... | a. For less than a township. | 380 | 7 | | | | | | |
| 6 days..... | b. For a township or more. | | | | 101 | | | | 52 |

BRANCH OF SILVICULTURE.

OFFICE OF EXTENSION.

Correspondence.

| Time limit. | Class of work. | Action taken in— | | An-
swered
on time. | Delayed. |
|--------------|-----------------------------|------------------|-----------------|---------------------------|----------|
| | | 36 hours. | 3 to 5
days. | | |
| 36 hours.... | "Special" letters..... | 79 | ..... | 79 | ..... |
| 3 days..... | General correspondence..... | ..... | 60 | 59 | 1 |
| | Total..... | ..... | ..... | 138 | 1 |

OFFICE OF SOLVICS.

Correspondence.

[illegible]

Efficiency report, week ending January 18, 1908—Continued.

BRANCH OF SILVICULTURE—Continued.

OFFICE OF MANAGEMENT.

Correspondence and Contracts.

| Time limit. | Class of work. | Action taken in— | | | | | | Number answered on time. | Number not answered on time. |
|--------------|---|------------------|---------|---------|---------|---------|---------------|--------------------------|------------------------------|
| | | 36 hours. | 3 days. | 4 days. | 5 days. | 6 days. | 7 to 10 days. | | |
| 36 hours.... | "Special" letters..... | 26 | 3 | | | | | 26 | 3 |
| 3 days..... | General correspondence..... | 56 | 17 | 2 | | | 2 | 73 | 4 |
| | Approval of contracts and bonds..... | | | | | | | | |
| | Approval of advance cutting applications..... | | | | | | | | |
| 4 days..... | Application for purchase of timber..... | 6 | 3 | 2 | | 2 | | 11 | 2 |
| 6 days..... | (1) Letters recommending closure of timber sale, timber trespass and special cases..... | 77 | 4 | 1 | 1 | 6 | 2 | 89 | 2 |
| | (2) Contracts—sales and special uses..... | 32 | 1 | 3 | 4 | 2 | 1 | 42 | 1 |
| | Report on trespass..... | | | | | | | | |
| | Total..... | | | | | | | 241 | 12 |

BRANCH OF PRODUCTS.

OFFICE OF THE CHIEF.

Correspondence.

| Time limit. | Class of work. | Action taken on time. | Held over. |
|--------------|-----------------------------|-----------------------|------------|
| 36 hours.... | "Special" letters..... | 0 | 0 |
| 3 days..... | General correspondence..... | 8 | 0 |
| | Appalachian investigation: | | |
| 36 hours.... | "Special" letters..... | 9 | 0 |
| 3 days..... | General correspondence..... | 36 | 0 |

Letters originating in Branch..... 39
 Total number of letters written..... 92
 Indexing and filing, up to date (3-day limit).

OFFICE OF WOOD UTILIZATION.

Correspondence.

| Class of work. | 'Special' letters (time limit, 36 hours). | | General correspondence (time limit, 3 days). | |
|---------------------------------|---|------------|--|------------|
| | On time. | Held over. | On time. | Held over. |
| Office of wood utilization..... | 15 | 0 | 44 | 0 |
| Section of computing..... | 0 | 0 | 0 | 0 |
| Section of drafting..... | 0 | 0 | 0 | 0 |
| Section of wood chemistry..... | 3 | 1 | 45 | 1 |
| Section of wood uses..... | 1 | 0 | 95 | 0 |
| Total..... | 19 | 1 | 184 | 1 |

Letters originating in the office..... 35
 Total letters..... 240

Efficiency report, week ending January 18, 1908—Continued.

BRANCH OF PRODUCTS—Continued.

OFFICE OF WOOD UTILIZATION—Continued.

COMPUTING.

Current requisitions.

| Class of work. | Received. | Completed. | | | | Progressing. | | | Untouched. | | |
|----------------------------|-----------|------------|----------------------|--------------|-----------------------|----------------------|--------------|-----------------------|----------------------|--------------|-----------------------|
| | | Total. | 1 week and less old. | 2 weeks old. | 3 weeks and over old. | 1 week and less old. | 2 weeks old. | 3 weeks and over old. | 1 week and less old. | 2 weeks old. | 3 weeks and over old. |
| Timber tests..... | 170 | 192 | | | 192 | 94 | | 329 | 170 | | |
| Moisture calculations..... | | 500 | 144 | 69 | 287 | 169 | | | | | |
| Summaries..... | | | | | | | | 1 | | | |
| Scale books..... | | | | | | | | | | | |
| Tree volumes..... | | 350 | | | 350 | | | | | | |
| Valuation surveys..... | | | | | | | | | | | |
| Acres yields..... | | 2,000 | | | 2,000 | | | 900 | | | |
| Volume tables..... | | | | | | | | | | | |
| Growth tables..... | | | | | | | | | | | |
| Form tables..... | | | | | | | | | | | |
| Miscellaneous tables..... | 2 | 3 | 3 | | | | | | | | |
| Copying forest tables..... | | 34 | | | | | | | | | |
| Checking reports..... | 1 | 1 | 1 | | | | | | | | |

DRAFTING.

Current Requisitions.

| Status. | Time registered. | | | | |
|---|-------------------|---------------|---------------|---------------|--------|
| | Less than 1 week. | 1 to 2 weeks. | 2 to 3 weeks. | Over 3 weeks. | Total. |
| Finished..... | 29 | 4 | 1 | 1 | 35 |
| Begun, work progressing..... | 14 | 2 | 1 | 7 | 24 |
| Begun, delayed, awaiting action of the offices..... | 5 | 5 | 1 | 16 | 27 |
| Begun, postponed for more important work..... | | | | | |
| Untouched, postponed for more important work..... | | | | | |
| Untouched, awaiting turn..... | 1 | | | | 1 |
| Total..... | 49 | 11 | 3 | 24 | |

OFFICE OF WOOD PRESERVATION.

Correspondence.

| Time limit. | Class of work. | Action taken on time. | Held over. |
|--|-----------------------------|-----------------------|------------|
| 36 hours..... | "Special" letters..... | 24 | 0 |
| 3 days..... | General correspondence..... | 187 | 3 |
| Letters originating in office..... | | | 10 |
| Total letters written..... | | | 221 |
| Reports, up to date..... | | | 0 |
| Indexing and filing, up to date (3-day limit)..... | | | |

OFFICE OF PUBLICATION.

Correspondence.

| Time limit. | Class of work. | Action taken on time. | Held over. |
|--|-----------------------------|-----------------------|------------|
| 36 hours.... | "Special" letters..... | 20 | 1 |
| 3 days..... | General correspondence..... | 29 | 0 |
| Letters originating in the office..... | | | 7 |
| Total letters written..... | | | 6 |

Status of current publications.

| Circular No. | Title. | Registered. | Review begun. | In time limit. | Review complete. | In time limit. | Typewriting. | In time limit. | Transmitted. | In time limit. |
|--------------|---|-----------------|----------------|----------------|------------------|----------------|--------------|----------------|----------------|----------------|
| 76 | Forests and Streamflow. | Sept. 17, 1906. | Oct. 1, 1906. | No. | Dec. 30. | No. | | | Jan. 4. | Yes. |
| 135 | Chestnut Oak, Southern Appalachians. | Mar. 8, 1907. | Oct. 3. | No. | Nov. 7. | No. | | | Nov. 15. | No. |
| 145 | Forest Planting, Northern Prairies. | Mar. 16. | Nov. 2. | No. | Nov. 7. | No. | | | Jan. 18, 1908. | No. |
| 147 | Forest Tables: Western Yellow Pine. | May 14. | Oct. 15. | No. | Oct. 18. | Yes. | | | Oct. 8. | Yes. |
| 117 | Preservative Treatment of Fence Posts. | Apr. 17. | Aug. 17. | No. | Aug. 23. | Yes. | | | Aug. 28. | Yes. |
| 136 | Forest Conditions, Southern New Hampshire. | June 12. | Oct. 15. | No. | | | | | | |
| 128 | Seasoning and Treating Arborvitae Poles. | June 17. | Oct. 26. | Yes. | Nov. 15. | No. | | | Nov. 16. | Yes. |
| 112 | Preserving Piling Against Marine Borers. | June 22. | Aug. 12. | Yes. | Oct. 1. | No. | | | Oct. 2. | Yes. |
| 123 | Analysis and Grading of Creosote. | Aug. 17. | Oct. 30. | Yes. | Dec. 6. | No. | Dec. 12. | No. | Jan. 4. | No. |
| 137 | Consumption of Poles in 1906. | Aug. 23. | Sept. 7. | Yes. | Oct. 17. | No. | | | Nov. 16. | No. |
| 142 | Vehicle and Implement Woods. | Aug. 29. | Oct. 5. | Yes. | Dec. 9. | No. | Dec. 12. | Yes. | Dec. 14. | No. |
| 125 | Production of Light Coopersage. | Sept. 5. | Oct. 11. | Yes. | Oct. 26. | No. | | | Oct. 26. | Yes. |
| 129 | The Drain on the Forests. | Oct. 3. | Oct. 3. | Yes. | Oct. 7. | Yes. | | | Oct. 10. | Yes. |
| 130 | Forestry in the Public Schools. | Oct. 5. | Oct. 7. | Yes. | Oct. 9. | Yes. | | | Oct. 10. | Yes. |
| 141 | Woods for Street Paving. | Oct. 31. | Nov. 2. | Yes. | Nov. 20. | No. | Dec. 3. | No. | Dec. 14. | No. |
| 138 | Woodlot Management, Ohio Valley. | Nov. 1. | Nov. 18. | Yes. | Nov. 22. | Yes. | Dec. 5. | No. | Dec. 6. | Yes. |
| 139 | Primer of Wood Preservation. | Nov. 2. | Nov. 17. | No. | Nov. 25. | No. | Dec. 3. | No. | Dec. 4. | Yes. |
| 140 | What Forestry has Done. | Nov. 4. | Nov. 7. | Yes. | Dec. 17. | No. | | | Dec. 20. | Yes. |
| (6) | Cutting Timber on National Forests. | Nov. 22. | Nov. 25. | Yes. | | | | | | |
| (6) | Report of Forester, 1907. | Nov. 28. | Nov. 28. | Yes. | Nov. 29. | Yes. | Dec. 2. | Yes. | Dec. 3. | es. |
| 143 | Relation of the Southern Appalachian Mountains to Inland Water Navigation. | Jan. 6, 1908. | Jan. 7, 1908. | | Jan. 11, 1908. | | | | Jan. 16, 1908. | Yes. |
| 144 | Relation of the Southern Appalachian Mountains to Development of Water Power. | Jan. 6, 1908. | Jan. 7, 1908. | | Jan. 11, 1908. | | | | Jan. 16, 1908. | Yes. |
| 77 | Forest Products of the United States, 1906. | Jan. 16, 1908. | Jan. 15, 1908. | Yes. | Jan. 16. | Yes. | | | Jan. 17. | Yes. |
| | Second-growth Hardwoods, Dutchess County, N. Y. | Jan. 18, 1908. | | | | | | | | |

a Bulletin.

b Contribution to Department yearbook, 1907.

c With office of law for approval till Jan. 13, 1908.

d Annual report.

AGRICULTURAL APPROPRIATION BILL.

| Circular No. | Title. | Galley proof. | | Page proof. | | Published. | Distribution. | |
|--------------|--|----------------------------|-------------------|--------------------|----------------------------|--------------|---------------|------------|
| | | Received. | Returned. | Received. | Returned. | | Required. | Work done. |
| 135 | Chestnut Oak Southern Appalachians..... | Dec. 12 ^a | Nov. 16..... | Nov. 23..... | Nov. 23 ^b..... | ..... | ..... | ..... |
| 137 | Forest Tables: Western Yellow Pine..... | Nov. 16..... | Nov. 16..... | Nov. 20..... | Nov. 25..... | Dec. 6..... | 364,000 | 171,304 |
| 136 | Preservative Treatment of Fence Posts..... | Dec. 7..... | Dec. 14..... | Dec. 27..... | Jan. 4..... | ..... | ..... | ..... |
| 138 | Sanitary Treatment of Fence Posts..... | Dec. 7..... | Dec. 7..... | Dec. 30..... | Jan. 6..... | ..... | ..... | ..... |
| 128 | Preserving Piling Against Marine Borers..... | Jan. 14, 1908..... | Dec. 21..... | Dec. 30..... | Jan. 3..... | Jan. 13..... | 15,000 | 14,728 |
| 112 | Analysis and Grading of Ceresote..... | Dec. 7..... | Nov. 20..... | Nov. 18..... | Nov. 21..... | Dec. 28..... | 7,500 | 5,657 |
| 137 | Consumption of Poles in 1906..... | Jan. 6..... | Nov. 1..... | Nov. 30..... | Dec. 2..... | Nov. 30..... | 740,000 | 338,268 |
| 142 | Vehicle and Implement Woods..... | Oct. 29..... | Nov. 22..... | Nov. 30..... | Dec. 2..... | Dec. 12..... | 122,000 | 95,246 |
| 125 | Production of Tight Coopersage..... | Jan. 14, 1908..... | Jan. 8, 1908..... | Jan. 16, 1908..... | Jan. 18, 1908..... | ..... | ..... | ..... |
| 129 | The Drain on the Forests..... | Dec. 23..... | Jan. 4..... | Jan. 8, 1908..... | Jan. 18, 1908..... | ..... | ..... | ..... |
| 130 | Forestry in the Public Schools..... | Dec. 30..... | Jan. 4..... | Jan. 8, 1908..... | Jan. 18, 1908..... | ..... | ..... | ..... |
| 141 | Woods for Street Paving..... | Dec. 21..... | Jan. 4..... | Jan. 8, 1908..... | Jan. 18, 1908..... | ..... | ..... | ..... |
| 138 | Woodlot Management, Ohio Valley..... | Dec. 21..... | Jan. 4..... | Jan. 8, 1908..... | Jan. 18, 1908..... | ..... | ..... | ..... |
| 139 | Primer of Wood Preservation..... | Dec. 21..... | Jan. 4..... | Jan. 8, 1908..... | Jan. 18, 1908..... | ..... | ..... | ..... |
| 140 | What Forestry has Done..... | Dec. 21..... | Jan. 4..... | Jan. 8, 1908..... | Jan. 18, 1908..... | ..... | ..... | ..... |
| (c) | Cutting Timber on National Forests..... | Dec. 21..... | Jan. 4..... | Jan. 8, 1908..... | Jan. 18, 1908..... | ..... | ..... | ..... |
| (d) | Report of Forester, 1907..... | Dec. 21..... | Jan. 4..... | Jan. 8, 1908..... | Jan. 18, 1908..... | ..... | ..... | ..... |

^a With office of management from Dec. 12, 1907.

^b Third proof received Jan. 9, 1908, returned Jan. 16.

^c Contribution to Department yearbook, 1907.

^d Annual report.

NOTE.—Standard time from time registered to review begun, three days; standard time from review begun to review complete, five days; standard time from review complete to typewritten three days; standard time from typewritten to transmitted, one day; twelve working days.

Another statement that I want to make, gentlemen, is a very general one, but I think it a very important one. This work of the Forest Service is, to put it in this way, the longest look ahead that the American people have ever taken. There is no other branch of the public work where foresight is as conspicuously recognized as it is in the forest work. We are coming to see, and have made rapid progress indeed in the last year, that not only is forest preservation necessary, but we have to extend the same point of view over the conservation of all other natural resources as well. Now, that means gradually the employment of foresighted, broad people in dealing with our timber lands. Our coal lands, our public lands, our waters, our rivers, our mountains, all the natural resources that we have, must ultimately come to be used with the idea of getting the most out of them for the nation as a whole. I think that idea is spreading very rapidly, and I was delighted last summer, in traveling about the West and speaking to the people, to find how quickly they welcomed a statement of that kind, and the same is true in the East.

My object in making this statement is this, that the leader, necessarily the leading idea, in this campaign for conservation, which means the campaign for the reasonable plan of development of the whole country, must be forestry. There is no other subject that demands foresight in the same way that forest work does, and just as rapidly as the forest work develops and receives popular appreciation throughout the country, just so rapidly will this idea of conservation spread. I am not trying, exactly, to get on the back of another horse and ride it to success, but I am anxious to impress upon you my strong belief that this forest work is an important one because of the direct results which it will achieve in protecting the timber supply, in protecting the streams, and in benefiting the grazing industry, and that it is the leader, and necessarily the leader, in a movement of such wide, general importance as to contain within itself the answer to the question as to whether the nation shall succeed in the future or not.

There are a great many nations of the old world that have taken the other point of view in this matter of conservation, and have driven themselves out of business or have fallen into an inferior position because they have overlooked the fact that you must conserve national resources if you are going to build a nation. You can not build a nation on anything else. I want to see this forest work progress, not only for its own sake, but for the sake of the influence I have been trying to tell you about and because the progress of the ideas which it represents is bound to be the progress of the more far-reaching ideas.

Now, I believe, gentlemen, that is about the extent of my general statement. If there are any other matters that occur to you, I should like to touch upon them.

The CHAIRMAN. I believe, then, we can go rapidly over the language on page 22 and the amendments and, perhaps, finish up Mr. Pinchot this afternoon. The first change that I notice is the addition of the words "but no such extension shall be made except by the purchase of land or rights therein found to be necessary for such protection, administration, and improvement." I understand that that is merely to place a limit upon the authority given in the preceding language.

Mr. PINCHOT. It does just exactly that.

The CHAIRMAN. As a matter of practice, to what extent have you taken advantage of the authority given in the proviso of which this is a part?

Mr. PINCHOT. We have not purchased anything at all, as yet. We find it is going to be absolutely necessary to buy certain ranger stations in regions where there is no water available for men. In the semiarid region a man may have taken up a spring, in a region where we can not have a ranger station without water, and that is the only place we can go.

The CHAIRMAN. Would you feel yourself authorized by the language here "to extend national forests," to go clear outside of any national forest across the country and buy a tract, say, in the White Mountains, if you had an appropriation for it?

Mr. PINCHOT. If I did think so, I would not do it. But the Comptroller of the Treasury, in a decision upholding our right to spend the appropriation for the purchase of a forest nursery site, has intimated that we could spend it for purchasing land to add to the national forests. I think the meaning of the word "extend" should be expressly limited as is now proposed.

The CHAIRMAN. Just a little further on we find the added language "and within national forests shall aid the other Federal bureaus and departments in the performance of the duties imposed on them by law."

Mr. PINCHOT. There are a great many places where the other Federal bureaus have duties to perform in the national forests, and I think it would be a great advantage, both to them and to us, for us to be able to help them. We are cooperating very closely indeed with them, a great number of them.

The CHAIRMAN. You have been doing that, as a matter of fact, without any such express authority?

Mr. PINCHOT. We have been doing some of it; yes.

The CHAIRMAN. And this is only intended to give you that authority?

Mr. PINCHOT. We need that authority, decidedly.

The CHAIRMAN. A little further on we find the words, "and hereafter the Secretary of Agriculture may from time to time divide and designate all lands heretofore and hereafter reserved for national forests under the provision of section 24 of the act of March 3, 1891, entitled 'An act to repeal timber culture laws, and for other purposes,' and acts supplemental to and amendatory thereof, after such lands have been so reserved, as he may deem best for administrative purposes." That was stricken out of the last bill, was it not, on the point of order?

Mr. PINCHOT. Yes, sir.

The CHAIRMAN. And you are trying it again, for the reason that you believe that if this authority were given it would be in the interest of good administration?

Mr. PINCHOT. It would be decidedly in the interest of good administration and economy. The national forests were located more or less in accidental form, and we are obliged to keep our books in accordance with the national forests. It happens many times that a supervisor will be so located under the present arrangement as to have part of his district very inaccessible, whereas if we could

redistribute, we could put a man in the middle of his district, make it easily accessible, and the expense would be very much less.

The CHAIRMAN. That is, what might be accessible for one man might be inaccessible for another man?

Mr. PINCHOT. Precisely.

The CHAIRMAN. You inserted the word "hereafter" in the line following what I read. That is intended to make this continue?

Mr. PINCHOT. Yes.

The CHAIRMAN. That also, I believe, went out last year, or such language has gone out.

Mr. PINCHOT. I do not think this did; at least, I do not remember.

The CHAIRMAN. On the next page there is quite a long paragraph which I will not stop to read, which you all see printed in italics, relating to the money received as contributions. Please explain that.

Mr. PINCHOT. That is to make it possible for us to put into the Treasury money that we receive from cooperators in protection and improvement work, instead of having to keep it ourselves. For instance, a county or citizens want a road or a telephone line built where it will benefit them and is needed by the Forest Service. They are willing to pay part of the expense, say \$500. I want to put that right into the Treasury as official moneys.

The CHAIRMAN. What do you do with it now?

Mr. PINCHOT. We must deposit it as unofficial moneys or make some complicated arrangements to prevent the contributors' money from ever coming into our hands. Thus we may audit the bills and refer some of them to the county for payment to the total amount of \$500. I want that \$500 paid into the Treasury.

Mr. POLLARD. You are not allowed to use that again, are you?

Mr. PINCHOT. No; but this gives us the right to.

The CHAIRMAN. As I understand, this is not the kind of money that Mr. Pollard referred to.

Mr. PINCHOT. No. For instance, if you own a piece of timberland, you want us to come and help you handle it. It will cost you a certain amount of money for us to do it. We estimate that amount of money and ask you to provide it. We deposit it in the Treasury and draw it out to pay the expenses of the work as they are incurred. We want to handle money contributed for the protection and improvement of the national forests (fire lanes, roads, trails, etc.) in exactly the same way, and instead of having to keep it under the bond of our disbursing agent, we would like to deposit it in the Treasury. The only novelty in this clause is the inclusion of protection and improvement within its scope. It is now the law, so far as forest investigations are concerned, by the agricultural appropriation act of June 30, 1906. The change will enable us to also deposit cooperative contributions for protection and improvement in the Treasury.

Mr. McLAUGHLIN. For that particular purpose?

Mr. PINCHOT. Yes.

The CHAIRMAN. Formerly you kept all the money that you received from any source—grazing, or the sale of land—in a sort of revolving fund?

Mr. PINCHOT. Yes.

The CHAIRMAN. That was drawn from the Treasury on your own check?

Mr. PINCHOT. Yes.

The CHAIRMAN. The last Congress changed that system and required that you should put in the Treasury all the money that you received from any source, such as grazing or the sale of timber, and that money can only be taken out of the Treasury upon an appropriation by Congress, just as any other funds. But in addition to the money that you received from the sale of property or privileges on the reserves, there does come into your hands, occasionally, money from men who wish you to cooperate with them in the management of their own property.

Mr. PINCHOT. Other persons, counties, etc., want to contribute money for the protection and improvement of the national forests. Money is now so contributed for forest investigations.

The CHAIRMAN. And that money you may expend. But it is not a part of the Government funds in the sense that it results from the sale of the privileges or the property of the Government. It is a fund contributed by a private citizen for a given purpose, and in order that it may be available for that purpose you must have it subject to your check, and all that you want in this language, as I understand it, is that you may be relieved of the responsibility of keeping that money during the interval between the time when it is paid to you and when you want to pay it out?

Mr. PINCHOT. We want to receive contributions for the protection and improvement of the national forests and put them in the Treasury, where they will be absolutely safe.

Mr. POLLARD. Would not such legislation result in increasing the amount of money available?

Mr. PINCHOT. To a very slight extent.

Mr. POLLARD. In other words, it will enable you to secure money from private individuals aside from the money appropriated by Congress to carry on your work.

Mr. PINCHOT. To a very small degree.

The CHAIRMAN. In what way would it increase the amount over what you now receive?

Mr. PINCHOT. If a man contributes a thousand dollars as a part of the cooperative plan for managing his timberland, I have got a thousand dollars more than Congress appropriated. That money is spent on this particular piece of land.

The CHAIRMAN. You would have that just the same whether this language goes into the bill or not?

Mr. PINCHOT. Yes, under the act of June 30, 1906. I want to do the same thing in cooperative protection and improvement work. We do this cooperative work anyway but do not handle the money of the contributors. This would not make any difference in the work.

Mr. POLLARD. Would it not? For instance, the Government appropriates a thousand dollars for cooperative work.

Mr. PINCHOT. Yes.

Mr. POLLARD. And you take it up with some forester in the West and he agrees to bear the expense necessary to carry on the cooperation; that may be an expense of a thousand dollars?

Mr. PINCHOT. Yes.

Mr. POLLARD. He pays that back. You carry on the cooperation with him, and he pays back the thousand dollars, and you keep rotat-

ing. You go to the second man with the same thousand, and the third man, and to that extent it either doubles or trebles or quadruples the amount of money available, does it not?

Mr. PINCHOT. The method is somewhat different. The money is all spent each time; we do not hold it.

Mr. POLLARD. No; but he reimburses you.

Mr. PINCHOT. He reimburses before we spend it; he pays in advance.

Mr. POLLARD. I can not see how it does not increase the money you have available.

Mr. PINCHOT. The cooperative fund certainly does increase the amount we have available, but this particular clause does not change the condition. This was in effect since June 30, 1906, and such cooperative work has been done ever since 1898.

Mr. POLLARD. It simply makes what you are doing lawful?

Mr. PINCHOT. No; it simply enables us to put the money in the Treasury, where it is protected by all the safeguards provided by law. It does not change the situation in any way in what we are doing, except we can put the money in the Treasury.

Mr. HAWLEY. It allows you to put the money in the Treasury, rather than some other place?

Mr. PINCHOT. Yes; and rather than devising some machinery which will prevent the money's coming into our hands at all.

Mr. POLLARD. It is a mere matter of convenience?

Mr. PINCHOT. Yes, sir; and of safety.

The CHAIRMAN. You do not think this would conflict in any way with the provisions of last year's bill?

Mr. PINCHOT. No; because they come from a different class of receipts.

The CHAIRMAN. I do not remember the language clear enough to know whether it specified the source of the receipts or not.

Mr. PINCHOT. The language is, "All proceeds from the national forests shall go into the Treasury," as I recall it.

The CHAIRMAN. We understand that. The next new thing is this:

And hereafter advances of money under any appropriation for the Forest Service may be made to the Forest Service and by authority of the Secretary of Agriculture to chiefs of field parties for fighting forest fires, and improving forests in emergency cases, who shall give bond under such rules and regulations and in such sum as the Secretary of Agriculture may direct, and accounts arising under such advances shall be rendered through and by the Department of Agriculture to the Treasury Department.

Mr. PINCHOT. The present situation is this: We have a series of laws and decisions which makes it impossible for a man to do anything else but pay for Government expenses out of his own pocket. For instance, if I want to go from here to Chicago, I have to pay my fare first and then get it back afterwards. A great many of our boys are very poor boys; the demands upon them for their traveling expenses and so on are much greater than they can meet, and I have been obliged, and have for years, indorsed the notes of the men in the Forest Service to the Riggs National Bank, so that they could borrow money at a reasonable rate of interest to do Government work.

Mr. HAWLEY. Were they ever reimbursed for the interest?

Mr. PINCHOT. No; they have paid the interest themselves. This is very unfair to them. There is no reason why the Government should not make these advances under bond. That is one side of it.

The other is that we find it in some cases almost impossible to fight fires unless they can be paid on the spot. Suppose there is a forest fire. The supervisor needs a dozen men. He goes into town, gets anybody he can, takes them up into the mountains to fight fire for three or four days, and then they come out. They may be hoboes, transients, anybody. If he has to send that account of each of those men for five or six dollars back to Washington, then have a Government check come out to this fellow, it happens in a great many cases that the man never gets it. He moves somewhere else. There is a delay of six weeks or two months. It is extremely difficult to get men under those circumstances.

The CHAIRMAN. Is it intended to give this to anybody except for purposes of fighting forest fires?

Mr. PINCHOT. Yes, in view of the need for it occasionally, as for investigation. This says, "for fighting forest fires, and improving forests in emergency cases."

Mr. HAWLEY. Mr. Chairman, is it customary in any other department to advance money to its employees under such circumstances?

The CHAIRMAN. I think so.

Mr. PINCHOT. The Geological Survey has authority of this kind, and the Coast and Geodetic Survey also.

The CHAIRMAN. As I understand it, then, the language is intended to advance money to the chief of forest parties for fighting forest fires or improving forests in emergency cases; where a bridge is swept away or something of that kind, you have to get temporary help quickly?

Mr. PINCHOT. Yes.

The CHAIRMAN. A little further on in the new language, but the old language of the bill, "to purchase law books to an amount not exceeding five hundred dollars." Those books are needed every year?

Mr. PINCHOT. Yes; there are new compilations of the State laws that we can not get free and have to buy, and as we have forests in all the Western States, we are obliged to keep ourselves posted on the progress of the laws in those States.

The CHAIRMAN. Do you usually expend about \$500?

Mr. PINCHOT. About that; a little less.

The CHAIRMAN. There is no particular sum set apart for technical journals for officers of the Forest Service, is there?

Mr. PINCHOT. No; there is none here. I can give you the amounts that we have spent for them; it is very small.

The CHAIRMAN. That is not necessary. Last year, I believe, you were authorized to use sums of money to provide a library in each of the headquarters?

Mr. PINCHOT. Yes, sir.

The CHAIRMAN. Is that appropriation repeated here?

Mr. PINCHOT. This is the same language, "technical books."

The CHAIRMAN. It is included in that language?

Mr. PINCHOT. Yes; that has been very effective, too.

Mr. HAWLEY. Among these law books, do you have any other books than the compilations of statutes?

Mr. PINCHOT. Yes; we are completing a set of the Federal Reporter as rapidly as possible. A number of standard text-books, as well as an encyclopedia and several digests, are necessary. The text-books are mostly upon the subjects of mining, water, and land laws.

The CHAIRMAN. On page 25, in your list of employees outside of Washington, I notice you have six chief inspectors, each with a different salary, ranging from \$2,100 to \$2,800.

Mr. PINCHOT. Yes.

The CHAIRMAN. What is the reason for that difference in those salaries?

Mr. PINCHOT. The capacity of the men and the length of service. In other words, we have avoided, in the Forest Service, so far as we possibly could, paying a fixed sum, associating the salary with the position.

The CHAIRMAN. I know that is your policy and I think, in a general way, it is a wise one. But each of these men has the same title, and I wondered whether each of them did practically the same work in point of volume and responsibility.

Mr. PINCHOT. No. The inspection districts vary considerably in the importance of the work that goes on in each of them. Some of them are much more important than others.

Mr. McLAUGHLIN. Does the difficulty you have in getting the right kind of men for such work increase any by the fact that they have to pass the civil service examination?

Mr. PINCHOT. No, I do not think it does, but it is very largely increased by the low salaries we must pay. We have had a great deal of trouble in getting good men in some places because of the comparatively low salaries we have had to pay.

Mr. POLLARD. I want to ask only one other question in connection with the one I did ask you, and that is this: In your judgment, would it be practical or wise to increase the fee for grazing, sheep or cattle or horses—

Mr. PINCHOT. At present?

Mr. POLLARD (continuing). Either one or all?

Mr. PINCHOT. At present?

Mr. POLLARD. Yes.

Mr. PINCHOT. No; it would not be wise.

Mr. POLLARD. You think that the fees that are charged are as much as the traffic will bear?

Mr. PINCHOT. That is it exactly; I do not think you could express it better. There was, at first, a great deal of opposition to charging this fee, but that opposition has gradually died down until the number of the stockmen in the West, with a few exceptions here and there, and those exceptions nearly all sheep men, are with us. It is much more important at this stage that we should have their good will and cooperation than that we should get a little more money out of the forests; and further, I do think that in consideration of the fact that this is new, that these men have been having these privileges without the charge, we are getting a fair return. Ultimately it will be worth a great deal more, but so large a proportion of this stock belongs to small men who are just getting started that I think it would be a pity to increase the charge.

Mr. HAWLEY. There has been one question I have been wondering about, and that is, does the grazing of the animals in the forests decrease the danger of fires?

Mr. PINCHOT. It does, in some places.

The CHAIRMAN. Does it not also increase the liability?

Mr. PINCHOT. It does, in some places.

The CHAIRMAN. On account of herders following around?

Mr. PINCHOT. Yes.

Mr. HAWLEY. I meant when they passed over and ate off the grasses and trampled down the twigs, that destroyed that loose stuff which burns so readily.

Mr. POLLARD. Where men come in and they get stumpage on the forest reserves, how does the charge compare with the charge made by private owners?

Mr. PINCHOT. I think on the whole it is rather higher.

Mr. POLLARD. It is rather higher?

Mr. PINCHOT. Yes. In fact, I am certain that it is higher. The reason of that is that the forest service was the first to discover the scarcity of timber in the West and to raise prices accordingly. It felt it to be a very strong duty to get for this timber what it was worth and to indicate by the rise in price that the timber was scarce.

Mr. GILHAMS. What is the average cost of the production of a steer three years old in that country?

Mr. PINCHOT. You have me; I do not know.

Mr. GILHAMS. As I understand it, they have to pasture them all the year there and do not have to feed them any grain.

Mr. PINCHOT. I think that varies a good deal. There are some places where they can do that and some places not.

The CHAIRMAN. Mr. Pinchot, we are greatly obliged for the information you have given the committee this afternoon. We may possibly wish to ask you to come before the committee again when we come to consider the details of this appropriation, but so far as the general statement is concerned, I think we will perhaps not need you.

Thereupon, at 4.45 p. m., the committee adjourned till to-morrow, January 24, 1908, at 10 o'clock a. m.

COMMITTEE ON AGRICULTURE,
HOUSE OF REPRESENTATIVES,
Friday, January 24, 1908.

The committee met at 10 o'clock, a. m., Hon. Charles F. Scott (chairman) in the chair.

The CHAIRMAN. Pursuant to the announcement of yesterday, the committee will take up this morning the consideration of the estimates for the Bureau of Chemistry.

STATEMENT OF DR. HARVEY W. WILEY, CHIEF OF THE BUREAU OF CHEMISTRY.

The CHAIRMAN. Dr. H. W. Wiley, the chief of the Bureau of Chemistry, is present, and I have pleasure in presenting him to the committee. I would suggest, Doctor Wiley, that you first give us the reasons for the increases in the statutory roll which appear upon the estimates, and then proceed to discuss in your own way the general work of your bureau. Let me call your attention, in the first

place, to the increase in the salary of your chief clerk, which you submit on page 26 of the estimates.

Doctor WILEY. Our chief clerk at the present time gets the lowest salary of any of the chief clerks of the bureaus in the Department of Agriculture and, I think, does fully as much work as any one of them. He is a very efficient servant, and with this increase he would still be below, I believe, all the others or nearly all.

The CHAIRMAN. Mr. Pinchot, chief of the Forestry Bureau, was before us yesterday, and he told us that he did not have any chief clerk; that he found he was getting better results by allowing or requiring the head of each of his various offices to look after the clerks in that particular office. In your organization would such an arrangement as that be any advantage over your present arrangement?

Doctor WILEY. I do not think it would be, Mr. Chairman, because the heads of the various offices are examining officers, experimenting officers, and they do not have any but special clerical service. Our general clerical service is all collected together under one head, and if I had no chief clerk I should have to be chief clerk all the time myself.

The CHAIRMAN. What are the functions of your chief clerk?

Doctor WILEY. He has charge of the whole clerical force of the bureau, amounting to I do not know how many, but it must be 40, maybe more. (There are 43 clerks in all in the bureau at Washington.)

The CHAIRMAN. I realize that your bureau must, of course, have a very different organization from that of Mr. Pinchot which is chiefly one of administration, and I suppose your office should remain as it is. What have you to say as to the proposed increases in your force? Altogether you have asked for 14 new clerks.

Doctor WILEY. This of course has come from the increased work incident to the normal growth of the bureau, which would not have been so much but for the increased work in the enforcement of the foods and drugs act. That has necessitated a very large additional force, as you may well understand, and all of these new clerks are practically due to the demands of that service. At the present time we not only have all the statutory places filled, but are compelled to pay quite a number of clerks from the lump sum, which we try to use solely for scientific purposes but are compelled to use to some extent for clerical service because the number of statutory places which we asked for last year and which were granted us proved wholly inadequate to the increased amount of work that was necessary to be done.

The CHAIRMAN. How many clerks in addition to those on the statutory roll last year are you now employing, how many of these additional 14?

Doctor WILEY. At least this many, I think; at least a dozen or 15 who are employed upon the lump sum now. There are 16 now on the miscellaneous roll.

The CHAIRMAN. As a matter of fact, what you are asking for here is that clerks already engaged and paid from your lump sum may be transferred to the statutory roll?

Doctor WILEY. Yes, we understand that it is the object in all cases to make regular clerical service statutory, and we are estimating for

that, so that they can be transferred from the lump sum roll to the statutory roll.

The CHAIRMAN. You did not really anticipate any increase during the coming fiscal year in your current force over what you have at present?

Doctor WILEY. I think we have now almost a sufficient clerical force, if not quite sufficient, to do our work, and this simply covers it into the statutory roll.

The CHAIRMAN. I notice you drop 1 library clerk. How many people does that leave in your library?

Doctor WILEY. We have a librarian and a library clerk, the two, and it is all they can possibly do to give the service required. In a service like ours a librarian and a library clerk have a little different functions from those in an ordinary library, that is, simply to care for books, to get them out and take them back; ours are asked to look up the literature of a subject and to mark in the books the places that the investigators want to read, so that they save a great deal of time; and also, being skilled in bibliography they can do that very much better than a person engaged in scientific investigations. For instance, I wish to investigate a certain subject. I say to my librarian, "I wish you to give me all the references, all the literature, you can find on that subject," and this is brought to me all marked, pages and everything, so that I can investigate the matter perhaps in one-fourth of the time, or one-fifth of the time, that it would require if I had to look them all up myself, and that is a great deal of the work.

The CHAIRMAN. What I wanted to learn especially was whether you are actually reducing your library force by the elimination of this clerk at \$900.

Doctor WILEY. No, we are not reducing it, because that will be one of the transfers to those statutory places. That is the reason that library clerk was not estimated for this year.

The CHAIRMAN. I do not see any librarian on your roll at all.

Doctor WILEY. Our librarian was appointed from the civil service list of scientific assistants, it having been ruled by the Civil Service Commission that a librarian was a scientific assistant, and I had this librarian placed on that roll and an examination was held for a scientific assistant, skilled in library practice, and that is the reason the librarian does not appear upon the statutory roll, in a statutory place, but as a scientific assistant.

The CHAIRMAN. Then, as a matter of fact, your librarian is carried on your lump sum?

Doctor WILEY. As a scientific assistant.

The CHAIRMAN. As a scientific assistant?

Doctor WILEY. Yes, that is under the classification fixed by the Civil Service Commission.

The CHAIRMAN. And you are dropping your librarian at \$900 because you expect to put in a clerk at \$1,000.

Doctor WILEY. In the statutory roll.

The CHAIRMAN. In the statutory roll?

Doctor WILEY. That is the purpose.

The CHAIRMAN. Have any of the members of the committee any further questions to ask in connection with these increases in the statutory roll?

Mr. HAUGEN. Will the salaries be increased by this transfer from the lump sum to the statutory roll?

Doctor WILEY. In this one case there is an increase. But the clerks we have on the lump sum, most of them, are at \$900, at the lowest rate. We have a few at a higher rate.

Mr. HAUGEN. You now propose to make them \$1,400 and \$1,600?

Doctor WILEY. There are some estimated increases here filed in order to provide for the higher clerks of the service, so that on the statutory roll they might be promoted to a higher sum.

Mr. HAUGEN. Those now at \$900 are to be promoted to \$1,400 and \$1,600?

Doctor WILEY. No, only to \$1,000. No higher statutory salaries are included for new appointees. In no case would they be promoted to such a salary as that, but some of the older clerks would be put into places estimated for at a higher salary.

Mr. HAUGEN. Increased right along the line?

Doctor WILEY. Yes, increased in that way.

The CHAIRMAN. If there are no further questions we will ask you to take up the general work of your bureau and call our attention particularly to anything new that you have been doing during the past year, and also to the results you are getting in the way of enforcing the pure-food act. That is one of the recent measures that has been put into your bureau for enforcement, and I think the committee would be interested in learning how you are getting on with it.

Mr. HAWLEY. Did you wish to call attention to these amendments or changes on page 28 of the estimates?

The CHAIRMAN. I thought we would do that after we had heard from the Doctor in a general way.

Doctor WILEY. The lines of work which are now in progress and which have been instituted since I last had the honor of appearing before this committee are mostly connected with the enforcement of the food and drugs act and the investigations which are necessary thereto. There are some new lines of work, however, which belong to the general work of the bureau that I should like to bring before the committee. We have completed in a more systematic way than ever before that part of the work of the bureau which is provided for, has been for many years, in the appropriation act, authorizing the bureau of chemistry under the direction of the Secretary of Agriculture to do chemical work for the other bureaus and divisions of the Department, and also for the other Departments of the Government. From the very start of the chemical service in the Department of Agriculture in 1862 it has been customary for other departments to appeal to the Agricultural Department for chemical assistance. So great had that work become some seven or eight years ago that it was recognized especially in the appropriation bill, and a clause was inserted covering that point, because there was some doubt whether under the general authority conferred upon the Department of Agriculture under the organic act we could undertake investigations not related directly to agriculture; and as many of the investigations asked for by the other departments were not related to agriculture, specific authority was obtained from Congress to do that work.

This has been continued ever since and is still in the act, and our work in that line has grown very greatly. So that we have now perfected an organization in a systematic way to attend to that work which we call, for the sake of designating it, the "contracts laboratory," because most of these requests which come from the other Departments are in regard to their supplies which they are securing by contract for the Government service. This work has grown especially large in the War Department, in the Post-Office Department and in the various printing bureaus of the Government. Not only do we receive constantly from the War Department materials offered on contracts, but we also have kept constantly under instruction for the last few years officers detailed from the War Department, from the Army and the Navy, in order that they might perfect themselves in methods of examinations of supplies offered at distant points; so that you can see we have kept school there for a great many years. We generally have two officers under instruction. Just now they are from the Navy Department. The next detail will probably be from the War Department. These men go into the laboratories and they learn our methods, microscopical, physical and chemical, for inspecting materials, so that when they go to distant points they can apply these methods to the examination of supplies which are offered. We examine the paper used by the various departments and especially by the Post-Office Department. We make specifications, on which the bids for these supplies are based, for paper and for ink. During the past year the Post-Office Department rejected several hundred thousand dollars' worth of materials supplied under contract, because according to our examinations they failed to meet the requirements; and you may have read of the fact that one of the manufacturing firms paid the Post-Office Department \$100,000 as a fine rather than to go into court to determine how much they should forfeit. This was done also upon our investigation.

The CHAIRMAN. In reference to your work on paper for the Post-Office Department; I believe you just referred to that?

Doctor WILEY. Yes, sir.

The CHAIRMAN. Have you been conducting any experiments in the line of testing any new materials for paper?

Dr. WILEY. Yes, we have been doing a great deal under the other authority, and also methods of testing papers we have developed—

The CHAIRMAN. I understand you have been testing paper, but the rapidly growing shortage in the supply of wood pulp has stimulated inquiries for some new material out of which paper could be made, and I wondered whether you have been conducting any investigations along that line.

Dr. WILEY. No, sir; except as we have in years past. We have investigated the bagasse from the cane mill, and the corn stalk and the cotton plant.

The CHAIRMAN. But you have not made a systematic and continued study of materials for paper?

Dr. WILEY. No, sir.

Mr. HEFLIN. If you had special provision for those improvements, since the work has grown so, you could do it?

Dr. WILEY. Yes, we could, and it seems to me our experts would be better qualified than any other set of experts could possibly be, because they have had such long training in it.

The CHAIRMAN. The language of the bill qualifies that study to leather and the materials and processes used in its production. That you have been doing?

Dr. WILEY. We have been doing a great deal, and investigating leather and the sources of tannin, the different sources of tannin, and the chemical action which takes place in tanning. We have been doing that for a number of years, giving a great deal of attention to that point. I may state further in regard to the paper work at the Post-Office Department, that we have detailed one of our chemists to go to Dayton, Ohio, and go into the mills where the paper is made for the Post-Office Department and examine it at the time, so that no delays will ensue from shipment and rejection. That is, they do not ship the paper now until our expert has examined it and seen that it comes up to required qualifications. In that way a great deal of discussion and time are saved to the Post-Office Department.

Mr. COCKS. How many other Departments of the Government maintain chemists?

Doctor WILEY. Maintain chemists?

Mr. COCKS. Yes.

Doctor WILEY. Almost every one. But they are maintained for specific purposes only.

Mr. COCKS. Practically you are doing the main amount of chemical work for all the Departments of the Government?

Doctor WILEY. Yes, sir; we are doing all the general chemical work for all the Government as asked for by the heads of Departments.

Mr. COCKS. Would it not be possible for you to do it all?

Doctor WILEY. Entirely possible, just as the English Government has a Government laboratory which corresponds very closely to ours in its functions. That Government laboratory is the laboratory for the board of agriculture. All the agricultural work is done in that laboratory. All the work for the collection of customs, and the work for the excise, and everything of that kind, is all done under one management.

Mr. COCKS. Do I understand that the Navy, War, and Post-Office Departments maintain chemists?

Doctor WILEY. No; the Post-Office has no chemists, and the Navy and Army have no chemists, except for powder, and for steel, i. e., chemists to test the quality of steel for the guns at the arsenals, but for nothing else. They have no chemists for examining supplies in general—no food chemists, and no textile chemists, and do not keep any establishment of that kind at all.

The CHAIRMAN. What bureaus of the Agricultural Department maintain chemical laboratories?

Doctor WILEY. The Bureau of Soils has a chemical laboratory, and the Bureau of Animal Industry has a very extensive laboratory.

Mr. POLLARD. Independent of your own?

Doctor WILEY. Oh, yes; altogether. And some chemical work, I believe, is done in the forestry service.

The CHAIRMAN. And some in the Bureau of Plant Industry?

Doctor WILEY. And some in the Bureau of Plant Industry—I believe in drug examinations.

The CHAIRMAN. I thought so.

Doctor WILEY. I do not know about that. We do a great deal of work for the Bureau of Plant Industry ourselves, but I do not know that they maintain any chemists at all, except as above indicated.

The CHAIRMAN. I may be mistaken about that.

Doctor WILEY. They send a lot of their work to us. We collaborate with the Bureau of Plant Industry a great deal in the chemical work, but I believe they do have a chemist in connection with the investigations of drugs.

Mr. HAUGEN. The Bureau of Plant Industry is also carrying on some investigations in connection with the paper matter?

Doctor WILEY. Not to my knowledge. I do not know that they are.

Mr. HAUGEN. I understood Doctor Galloway to say the other day that they were. Do you know what the Forestry Service is doing in the way of the examination of the paper question?

Doctor WILEY. I know that they have a chemical laboratory here in the city, but I am not acquainted with just the extent or nature of their work.

Mr. POLLARD. You do not know whether your work is a duplication of theirs?

Doctor WILEY. No; I do not. I have no means of knowing.

Mr. POLLARD. Do you think that your Department is in a position to do the chemical work for the Bureau of Soils, for instance, more economically than they can do it?

Dr. WILEY. I would not like to say anything which would be embarrassing to the Bureau of Soils, but since you ask me the question I will be very frank with you, and I will say yes.

Mr. POLLARD. Why?

Mr. WILEY. Well I do not see any reason why the chemists of the Department of Agriculture should not be charged with the chemistry of everything relating to agriculture. Before the inauguration of the Bureau of Soils we did all of that kind of work, all soil analysis and all fertilizer analysis, in collaboration with the chemists of the United States, and worked in perfect harmony with them, and, I think, with success.

Mr. HAWLEY. If you did any of the work, would that make possible a reduction of the number of chemists employed?

Dr. WILEY. It probably would, because the maintenance of separate chemical establishments always means increase of expense of administration.

Mr. LEVER. It would merely centralize the work?

Dr. WILEY. It would centralize the work. That is the most economical way of doing it.

The CHAIRMAN. You are asking for an increase of about \$100,000 in your lump sum. Can you give the committee some reasons why that increase should be made?

Doctor WILEY. A part of that, Mr. Chairman, is for the normal growth of the various divisions of our work. For instance, our work in connection with the other Departments is growing constantly. We have now, I suppose, sufficient work all the time to keep four or five chemists busy for the other departments of the Government. That is growing gradually. Then our investigations in various lines are naturally expanding some, but not much. I suppose \$20,000 of this increase would be sufficient for the ordinary normal growth in the bureau for the next year. The greater part of it is for the expansion

of the service in connection with the enforcement of the food and drugs act. We have a plan to erect 5 additional laboratories if this amount is given; but before I speak of that I want to show you the distribution of laboratories at the present time (showing a map) in connection with the food and drug service. The square on this map represents a chemical laboratory; the circle and the square together represent that an inspector has his headquarters at that point. The circle by itself shows the headquarters of an inspector where there is no chemical laboratory. The double circle shows where two inspectors are assigned to one locality. Now, these cover all the laboratories which are in operation. We are building now, and will soon have equipped, laboratories in Pittsburg, St. Louis, and in Omaha, in addition to these, and we want to put two more laboratories, making five in all, one probably at Nashville or Memphis, and one at some other unprovided territory. Those places are not decided upon definitely. The distribution of this work is necessary on account of the character of the inspection and examination. A great many of the samples which are secured for examination are perishable—for instance, milk—and need to be examined promptly.

The laboratories at the ports of entry are necessary, because if you were to attempt to take samples at the ports and transmit them to Washington and have them examined and returned to the ports, it would cause such a delay in the entry of goods that it would be extremely annoying. You will understand that a very large percentage of the goods detained at the ports for examination prove to be all right, and examination shows that the goods are in harmony with the law, and they are therefore immediately released and not detained any longer than is necessary to pay the ordinary duties. So that by the time they are ready to liquidate the duties we are ready to say to them, "Your goods are ready for release." But if we find the goods are misbranded and adulterated, then we are required by law to give notice to the importer who has the right to come before the inspector and be heard, and naturally an importer would not be expected to travel from all parts of the United States to any central station, and therefore he goes to the laboratory where his goods are and where he is and makes a statement to the inspector there. If our inspector is satisfied from the statement that the goods are all right he releases them without further notice. If, however, he thinks that the goods are misbranded or adulterated, he sends the case to Washington.

The CHAIRMAN. Will you continue from that point and let us know what is done when it goes to Washington.

Doctor WILEY. When the case of this man goes to Washington it is immediately turned over to our central food-inspecting laboratory, and there it is immediately examined, just as soon as it can be, and if the result of the examination at the port is confirmed, as it usually is, then the finding goes to the board of food and drug inspection.

The CHAIRMAN. Who compose that board?

Doctor WILEY. It is composed of myself as chairman and Mr. McCabe, the solicitor, and Doctor Dunlap, and this board then examines the goods and determines whether or not in the light of the testimony the goods covered by the invoice should be excluded from the United States, and if so we report to the Secretary, who thereupon informs the Secretary of the Treasury that the goods are not suitable for importation, and the Secretary orders them to be re-

shipped within ninety days. If they are not reshipped within ninety days the Secretary of the Treasury takes charge of them and destroys them.

The CHAIRMAN. Is there any appeal from the decision anywhere along the line?

Doctor WILEY. An appeal is often made from the decision of the board to the Secretary.

The CHAIRMAN. After the Secretary passes on it is there then any appeal?

Doctor WILEY. The only appeal that can then possibly be made is to the courts, and no such appeal has ever been made in the six years in which this system has been in operation.

The CHAIRMAN. Have there been many cases in which food has been reshipped?

Doctor WILEY. Very many indeed, hundreds of cases. Now we exclude many invoices of food products coming to this country almost every day.

Mr. POLLARD. In violation of the pure-food law?

Doctor WILEY. Yes, in violation of the pure-food law, either misbranded or adulterated. We do not have to go to a court and try them before a jury. The goods are not in the United States; they are foreign goods, and by the act of Congress they are excluded.

Mr. COOK. I have just come in. Did I understand you to say there was a duplication of work between the bureau of chemistry and some of the other bureaus, say the Bureau of Plant Industry?

Doctor WILEY. Not the Bureau of Plant Industry.

Mr. COOK. What bureau?

Doctor WILEY. The question was whether other bureaus had chemical laboratories.

Mr. COOK. I would like to know if they have.

Doctor WILEY. In the reply I made I said that the Bureau of Soils had a chemical laboratory, and the Bureau of Animal Industry, and the question was asked whether the Bureau of Plant Industry had one, and I said I thought not.

Mr. COOK. From your long experience and observation why would it not be better for the Department of Agriculture to have one bureau to make all the determinations and let them all come under the head of the Bureau of Chemistry? Would not that be more valuable and more satisfactory and avoid a duplication of work between your own bureau and the others?

Doctor WILEY. I have already expressed my opinion in that respect.

The CHAIRMAN. Permit me to say that this matter was all covered before you came in, and if you will let it go by, when the printed report comes you will see the Doctor's answer.

Mr. COOK. I would like to have the Doctor answer that question in his own way, if he will.

Doctor WILEY. I will try to answer that in the way I did before. I do this without criticising the other bureaus at all, and as an individual with long experience in this connection. My own opinion as an individual is that this work can be well, efficiently, and economically done under a common direction. I think that is the history of all work of this kind.

Mr. POLLARD. If this transfer should be made to your bureau, is your office or bureau now equipped to do that work?

Doctor WILEY. We could not do all the chemical work for all the bureaus with our present force.

Mr. HAUGEN. How much of an increase would you want?

Doctor WILEY. It would depend on how much they would want done. I have not any idea as to the extent of that work.

Mr. HAUGEN. Can you give an estimate?

Doctor WILEY. I do not know how much is doing, nor do I know the character of it. I am totally ignorant in that respect except by common knowledge, and I have no other way of finding out. I have always been of opinion, irrespective of any part that I might take in it, but as a general principle, that one kind of investigations in a department would be best done under a single direction. If the other bureaus of the Department want entomological investigation done, I think it could be best done under the Bureau of Entomology. If in my own work I wanted entomological investigations I should go to the Bureau of Entomology and ask a collaborator to make them. We have done that repeatedly. We have made all the examinations of insecticides as to the amount of poison they really had in them, and you would be surprised to know how many of them are fraudulent, and we tried them with the Bureau of Entomology who took them right out in the field and tried them on the insects. That is, in my opinion, the ideal way of doing work of this kind.

Mr. LEVER. What determined you in the location of these proposed food and drug laboratories?

Doctor WILEY. The magnitude of the trade. We selected those places where the greatest amounts of food and drug products were to be found. We have to control drugs also.

The CHAIRMAN. About what does it cost to install a laboratory?

Doctor WILEY. A moderate laboratory where 3 people could work would cost about \$5,000 to install, to put up the necessary appliances, and for larger numbers not quite so much in proportion; but if you had to provide for a larger number of people it would be a larger sum.

The CHAIRMAN. Are you able to get quarters in the Federal buildings in most of the places?

Doctor WILEY. In the greater number of cases we have quarters in the Federal buildings. There are some places where the Federal buildings are so filled that we could not get quarters. Chicago is a case of that kind. They have no room for us at all. In New York, Boston, and Philadelphia we are in the Appraisers' Stores.

The CHAIRMAN. After a laboratory has been equipped in such a city as Chicago or Milwaukee or St. Louis, what is about the annual average of maintenance, including salaries?

Doctor WILEY. I could only give that in a rough way. The cost of supplies, of chemicals and apparatus is of course always considerable, and the salary list depends on the numbers employed and the salaries given, but I should say for each chemist the average salary is about \$1,800, and the average supply of material for a single chemist's work could be, I think, put at about \$700; so for each person from about \$2,200 to \$2,500.

Mr. HAWLEY. Do you charge any fees for making these examinations?

Doctor WILEY. None whatever.

Mr. COOK. I would like to ask if all these various branches are under your supervision.

Doctor WILEY. Yes.

Mr. COOK. Are they all equipped with a modern plant to make determinations?

Doctor WILEY. Yes, sir.

The CHAIRMAN. Will you tell to the committee just the methods pursued in enforcing the pure-food act. Suppose one of your inspectors finds a food that he thinks suspicious. Just tell what is done.

Doctor WILEY. I think I can do that in a very few words, so that it will be clear to you all. First, in regard to imports. No invoice is passed at the ports until it has been inspected by a member of our Bureau. That is, the Treasury Department will not liquidate any invoice for duties until it has been inspected and passed by an agent of the Bureau of Chemistry. That is under the law.

Mr. POLLARD. Pardon me a moment. That applies, of course, in the same way to goods that do not pay duties?

Doctor WILEY. Everything. We have no reference to duty, but every invoice, whether it pays duty or not, goes to the collector.

Mr. HAWLEY. Your remark applies only to foods and drugs?

Doctor WILEY. Foods and drugs. If upon examination of the invoice it is of a character which we find usually all right, or for some other reason we do not wish to examine it, we stamp it "No samples desired." That goes then to liquidation. If we want to examine it we attach a tag with the description of the samples required.

Mr. HAWLEY. Who takes these samples out?

Doctor WILEY. Our inspectors; we take them out, but the Secretary of the Treasury is the only person that has the right to open the package and give them to us. We open no packages ourselves. Then they go immediately to the laboratories, where they are examined for their labels and contents. If the label is found to be wrong it is a misbranded article. If the contents are adulterated it is an adulterated article. In either case we give notice to the importer that his goods have been detained and he has a right to come and be heard. Then, upon the result of the hearing and examination, the chief of the local laboratory decides whether or not it shall be released. If he thinks it is all right to release, that is the end of it and the invoice passes to liquidation. If he does not it goes to Washington with a transcript of the hearings and a reexamination is made. If the first examination is confirmed the goods are excluded; if not confirmed the goods are released. That is for the foreign goods.

Now, for interstate commerce it is entirely different. It is much more difficult to find out anything about interstate commerce, because it passes everywhere. There are no ports of entry. But if we in our examinations of foods in general have found that any certain article is likely to be adulterated, we instruct our inspectors to get samples of that article. I will give you an illustration that has just been finished. The city authorities of St. Louis informed us that in their opinion large quantities of adulterated milk were going into St. Louis from Illinois. We sent inspectors and chemists, and we traced those shipments from the place where they were put on the train. Our inspector would get right on the train with the cans, and while

in transit he would take samples from those cans. The cans were marked and the samples were identified and sent in for analysis.

Mr. LAMB. How did he get at the cans to open them?

Doctor WILEY. We took the samples under the authority of the St. Louis Board of Health.

Mr. HEFLIN. Under the law you had authority?

Doctor WILEY. No; we have no authority to take a sample unless authority is granted to us willingly.

Mr. HEFLIN. Suppose they declined?

Doctor WILEY. Then we would go right in the open market and buy. That is the way we do it. You could not go into the open market in St. Louis and buy a can of milk; you would not know where it came from. We had to trace it from another State. We found a great many cases of adulterations in one week.

Mr. LAMB. What did the adulterations consist of principally?

Doctor WILEY. Mostly skimming, or addition of water. Mostly skimming, but those two things chiefly.

Mr. LAMB. Anything added?

Doctor WILEY. No, sir; nothing but the cream taken off and water added.

The CHAIRMAN. You call skimmed milk adulterated?

Doctor WILEY. No, sir; milk, skimmed milk, is not adulterated, but sold as milk it is. Skimmed milk is adulterated milk if it is sold as milk, under the law.

The CHAIRMAN. That is what I asked. In answer to the question you said that it was adulterated mostly by skimming and sometimes by the addition of water.

Doctor WILEY. Yes, sir.

The CHAIRMAN. I wondered if you called skimming of milk that was intended to be sold as whole milk an adulteration.

Doctor WILEY. Yes, sir, skimmed milk that is intended to be sold as milk is an adulteration, because a valuable ingredient has been abstracted, and that makes an adulteration under the law; or if water has been added, material has been added to debase it, and therefore it is adulterated under the law.

The CHAIRMAN. You found 10 positively harmful materials.

Doctor WILEY. We found preservatives in but two samples, because samples were taken in the winter, but I imagine if we had them in the summer we would have found more preservatives.

The CHAIRMAN. Will you follow that up and tell us what you did?

Doctor WILEY. We followed the law exactly. The law says when anybody offends criminally against this act, that fact shall be determined by the analysis of the bureau of chemistry. The law says that the bureau shall make an examination and if it appears that the article is adulterated or misbranded the Secretary of Agriculture shall cite these facts to the district attorney, but before he does that the law says that the person accused shall have a chance to be heard; so we cited everyone of these persons to come to St. Louis on a certain day—three days together, there were so many of them we could not take them all one day—and we had a stenographer, and every man was heard and allowed to state his case.

Mr. BEALL. Before whom?

Doctor WILEY. Before an agent of this Department.

Mr. BEALL. One man?

Doctor WILEY. One man and one inspector—two men. These men have no decision in the matter, they simply report results. This stenographic report was made and our laboratory chief in Chicago, Doctor Winton, was sent there. I got a letter from him saying that these examinations were completed and the stenographic report would be out in a week and he would transmit the whole to us.

Mr. HEFLIN. These two men simply took the evidence down.

Doctor WILEY. Yes, they are like commissioners.

The CHAIRMAN. What happens when this report gets to Washington?

Doctor WILEY. When this report gets to Washington it goes before the board of food and drug inspection. If they decide after reading the evidence and seeing the analyses and samples that it was adulterated, the secretary will inform the district attorney at that point that the law has been violated.

Mr. HEFLIN. When he informs the district attorney, does he instruct him to institute proceedings?

Doctor WILEY. The Secretary does not instruct him. The law instructs the district attorney to institute proceedings, and then he takes the people who make that examination and they go into court and give the testimony—the inspector and the chemist.

Mr. COOK. I would like to ask if the members of this board are graduated chemists and metallurgists?

Doctor WILEY. Doctor Winton is a chemist of large experience. The inspector with him is not a chemist, but simply a man skilled in the examination of foods and drugs.

Mr. LAMB. In the meantime does the traffic, the buying and selling of this milk, go ahead as formerly?

Doctor WILEY. No; as soon as they found out they were being inspected they reformed.

The CHAIRMAN. Have there been many prosecutions under the act?

Doctor WILEY. None have been decided by the courts, but a great many are in the hands of the district attorneys.

The CHAIRMAN. In a majority of instances you find a disposition on the part of the manufacturers to conform to the act, do you not?

Doctor WILEY. Almost unanimously.

The CHAIRMAN. And a disposition, you just said, to reform when they are caught in violations of it?

Doctor WILEY. I would not call that a very great moral merit to reform after discovery, but a great many people are violating this law unwittingly; they do not know they are doing it, and the moment we show them they are they stop. We would not like to bring any prosecution against a man of that kind at all, but sometimes it is necessary.

Mr. POLLARD. In this one concrete case, what is going to be the result of that? When these transcripts come down here and this board you speak of examines the testimony of the experts and the shippers and they find that the law has been infringed, do they direct the district attorney to prosecute them?

Doctor WILEY. No, we report this to the Secretary of Agriculture and he sends the papers to the district attorney and it is his duty to begin to prosecute the cases.

Mr. POLLARD. Suppose those fellows have violated the law ignorantly, they will not be prosecuted?

Doctor WILEY. I do not believe a man skims his milk or adds water to it ignorantly.

The CHAIRMAN. But that would be a matter in the discretion of the district attorney?

Doctor WILEY. If he thinks the evidence is not sufficient to bring a case, he will not bring it.

Mr. POLLARD. A fellow might skim his milk who might not know it was in violation of law.

Doctor WILEY. I do not know about that.

Mr. HEFLIN. Ignorance of the law is no excuse.

Mr. POLLARD. But I understood the Doctor to say that in cases of that kind they would not prosecute.

Doctor WILEY. If we think that a man simply through inadvertence has done a thing contrary to the law and if, on the law being cited he is willing to stop, we do not think such a man ought to be prosecuted unless it be as a warning to others.

Mr. POLLARD. Do you not think that would be universally the case; if you caught a thief, he would be willing to promise to reform?

Doctor WILEY. We do not take a man's protestations as evidence, because every man we ever had before us promises he will stop. We got a case down here where a man was selling renovated butter as Elgin creamery. He said he did not intend to offend the law. We did not take any such evidence as that. He did intend to offend the law, and he had a great big sign up "Elgin Butter," and he was selling nothing but renovated butter.

Mr. HAWLEY. I am glad you got him. I think I bought some butter of him.

Mr. McLAUGHLIN. Who exercises this discretion as to what cases shall be prosecuted, some one in your Department or the district attorney?

Doctor WILEY. The law devolves upon the Bureau of Chemistry the original judgment. The agents of the Bureau of Chemistry under the law are the persons who are to say whether or not in their opinion the articles are adulterated. If that is approved by the board of food and drug inspection, that goes to the Secretary, and the Secretary does not usually review the finding of the board. When he gets these opinions of the board he sends them to the district attorney.

Mr. HAWLEY. Have there been any convictions under this law?

Doctor WILEY. We have not had any cases in the courts. There have been one or two cases set, but postponed by request of the defendants; but we will have a great many cases very soon.

Mr. LEVER. Here (pointing to the map) is a large area of the country, including four or five northwestern States, without a laboratory or inspector in it. How do you police that?

Doctor WILEY. That is almost impossible to do, the area is so great, the distance is so great, although if we had larger sums we would put inspectors out there.

Mr. HAWLEY. Are you making any investigations as to the meat products of diseased animals?

Doctor WILEY. No; that is wholly under the Bureau of Animal Industry.

The CHAIRMAN. Will you describe to the committee the inspection system you maintain?

Doctor WILEY. Yes, sir. Our inspectors were appointed after one of the most rigid examinations that such a body of men ever had. Out of 1,400 candidates only about 60 or 70 passed the examination, so that you may know it was very rigid. The examination was not a chemical or scientific examination. It was a test of what experience these men had in inspecting foods and drugs and of the knowledge they had of foods and drugs.

Mr. HAUGEN. I understood you to say that you paid particular attention and consideration to getting experienced men, practical men, experienced in the inspection of foods and drugs.

Doctor WILEY. Yes, sir.

Mr. HAUGEN. Was any consideration given to that in these selections?

Doctor WILEY. Yes, sir.

Mr. HAUGEN. How many were appointed that had experience and knowledge of drugs and merchandise?

Doctor WILEY. Every one was required to state his experience, its character and length of time, and that was counted as a part of his grading.

The CHAIRMAN. This examination was carried on through the civil service?

Doctor WILEY. Yes, sir.

The CHAIRMAN. How much credit did you give to the number of years' experience? Was it measured by the number of years' experience?

Doctor WILEY. You mean what credit was given for that?

The CHAIRMAN. Yes.

Doctor WILEY. I do not remember that.

The CHAIRMAN. I have heard some complaints that those men were submitted to the most technical examination, and the fact that only 60 out of 1,400 passed would indicate that it was a most severe technical examination.

Doctor WILEY. It was a severe examination, because we wanted to get the best men that the country could afford.

The CHAIRMAN. How many of those 70 who passed were appointed and assumed their duties?

Doctor WILEY. We have now about 40. About 40 people were appointed.

The CHAIRMAN. What are their duties?

Doctor WILEY. Each one has headquarters, and from that he travels under direction to any place we may desire to send him. Their duties are to secure such samples of such goods as they are instructed to. For example, we want to examine a particular line of goods; for instance, say, goods that have been polished or coated. The law says if goods are polished or coated or colored or powdered whereby damage or inferiority is concealed they are adulterated. For instance, take a case just at hand. We had evidence that a coffee store in New Orleans was shipping a polished coffee out of the state, and our inspector got hold of the materials which they used in polishing it and sent them on for examination, and it proved to be a chromate, a very poisonous substance, whereupon we instructed him to identify an invoice of the goods which would be shipped beyond the borders of Louisiana. He telegraphed us that a certain number of packages in a certain car, identifying it, had been shipped that day to a certain

man in Nashville. The Secretary of Agriculture notified the district attorney to seize those goods on arrival in Nashville under section 10 of the act for process of libel for condemnation. On arrival at Nashville the United States marshal took possession of them, and those goods are now being subjected to our analyses, and so forth, to see if they have been in any way injured or in any way made deceptive by this process, and if so we will institute a suit for libel for condemnation, and confiscate the goods. If the goods are found to be all right, they will be released.

Mr. COCKS. What is the object of polishing coffee?

Doctor WILEY. We suppose to conceal inferiority. But what we objected to chiefly was putting a poisonous substance on it. We would not object to the polishing of the surface if he did not put on an injurious substance, but here was a substance used that would certainly get in the crack of that coffee and you would never know it.

Mr. HEFLIN. It makes it look like a solid grain.

Doctor WILEY. Yes; it is a green, not a roasted, coffee, and it makes the berry look green and fresh.

The CHAIRMAN. What do you pay these inspectors?

Doctor WILEY. The chief inspector, who directs the whole work, gets \$2,500.

Mr. POLLARD. The chief inspector here in Washington?

Doctor WILEY. Yes; he is here in Washington. The others get from \$2,000 to \$1,200. I suppose the average is \$1,600. They get all their traveling expenses, of course, when on duty.

Mr. LEVER. What portion of this estimated increase is to be used in getting more inspectors for this inspection?

Doctor WILEY. Part of this increase is for the establishment of these additional laboratories where there are none now, and part for the additional inspectors.

Mr. LEVER. How many additional inspectors do you want to get?

Doctor WILEY. After we get this increase we will have 10 more inspectors, and 5 more laboratories, at least.

Mr. LEVER. It seems to me with your present force you can not very well enforce the pure-food act. Here is a great strip of territory up here that is absolutely uncovered.

Doctor WILEY. That is not covered.

Mr. LEVER. And here is another strip down here in Texas and New Mexico, and here is a great strip in here uncovered, and it looks to me like you need at least one in every State.

Doctor WILEY. In my estimates to the Secretary I asked for \$200,000, but he thought \$100,000 would be sufficient. But whatever you give us we will utilize the best we can.

Mr. LEVER. I would think these people of New Mexico and Idaho and Nebraska are certainly as much entitled to inspection as they are anywhere else.

Doctor WILEY. We ought to have a laboratory at Salt Lake, and two or three up there in the Northwest, but we are not asking for anything specific in these estimates.

Mr. LEVER. You ought to have one or two in South Carolina, too.

Doctor WILEY. I would be very pleased to have one there.

The CHAIRMAN. Are these demands on your bureau in the way of the enforcement of this law. Have there been any demands in the line of the enforcement of this law that you have not been able to comply with under your present appropriation?

Doctor WILEY. Of course, there are many lines of work that we do not attempt at all now, because of the lack of force with the organization now and with the nucleus we have now. It is getting to be a trained nucleus. Every increase of this kind will make the law more effective.

The CHAIRMAN. Have you noticed any inclination on the part of State or municipal authorities to shoulder off on to your force the enforcement of city or State laws?

Doctor WILEY. None whatever. On the contrary, the State authorities have been most cordial and cooperative. The law, as you know, makes each State official charged with the enforcement of the foods and drugs act coordinate with the Secretary of Agriculture in the enforcement of the act. The law provides that any State official may bring suit and inform the district attorney. But the other parts of the law render it necessary, it seems, that he should do so in collaboration with the Department of Agriculture, because section 4 says that all examinations of specimens under this act shall be made by the Bureau of Chemistry or under its direction or supervision. Hence if a State official should make the examination alone without the supervision of the Bureau of Chemistry, the case would probably be thrown out of court, because the law would not be complied with. In the plan we are considering and which I have recommended to the Secretary at the request of a great many state officials of North Carolina, Michigan, and half a dozen others, where the State authorities have written in to us to get in touch with us, I have recommended to the Secretary that each State should designate one of its officials who might be commissioned to undertake these examinations under the supervision and direction of the Bureau of Chemistry, and you see how economically that would work out.

Mr. POLLARD. Who would pay that man, the State or the Government?

Doctor WILEY. That is a question, but I think when he works for us, under our supervision and direction, we should pay him for the time, and that is the proposition we make to the State official, that he shall designate some one, and when he works for us he shall not draw any salary from the State, but shall be paid a per diem by us.

Mr. POLLARD. Would not his duties be along the line of inspection of goods, wholly irrespective of the State?

Doctor WILEY. That is just the reason. When he gets hold of a line of goods that have come into the State from outside, in the line of his duties, he could report on that at once, and then the State authority, if he had done that under our supervision and direction, could report it to the district attorney, and it would much simplify and facilitate the execution of the act. We would have the services of a large body of trained men in the States, and would only have to pay them for the few days they worked for us.

Mr. POLLARD. You think there would be no danger of those men drifting into a position where they would work for the Government all the time and draw salaries from the Government?

Doctor WILEY. No, sir: we would not countenance anything like that. As a result of our examinations for additional chemists, a large number of State chemists passed the examination, and we have commissioned a few of those State chemists, with the consent of their superior officers, always, as chemists of the Bureau of Chemistry, and

they are paid for their services. Now, out of a dozen or more men of that kind I do not think we have spent \$500 during the whole year.

Mr. POLLARD. You have some now?

Doctor WILEY. We have some now who have passed the examination are commissioned as employees. I do not think we have spent \$200 on them.

Mr. COOK. How long have you had charge of the Bureau of Chemistry?

Doctor WILEY. If I have the good fortune to live to the 9th of April, it will have been twenty-five years.

Mr. COOK. I knew that it was a long time, and that is the reason I asked the question.

Mr. POLLARD. Will you tell us whether the pure food and drugs act is being enforced pretty well at the present time?

Doctor WILEY. It is not being enforced through the activities of the legal channels, but its great enforcement is in the moral purpose behind it, which has appealed to the whole community, and especially to the manufacturers.

Mr. POLLARD. Then if it is being enforced now, why make an additional appropriation of \$100,000?

Doctor WILEY. You will always find a lot of people who wish to evade the law, and if the great majority of manufacturers want to obey it, as they do, it is not fair that they should be brought into competition with those who wish to adulterate and misbrand.

Mr. POLLARD. If the law is being enforced with your present force, why increase the appropriation?

Doctor WILEY. That is a question in the discretion of the committee here. It has just been pointed out that we have large areas where we are not making any effort at all, because of the lack of men and funds. If we maintain an efficient force we will keep up the high mark of food and drug manufacture, just as if you maintain a big navy and army you will maintain peace; but the very moment that a certain class of people find that there is no supervision, or an inefficient supervision, the old practices will begin again, and those who are genuinely obeying the law and making high-class foods and drugs will be brought into competition with misbranded articles and adulterated articles, and it will make it almost impossible for them to conduct their business.

Mr. POLLARD. If they had a competitor they knew was violating the law, would they not at once complain to you?

Doctor WILEY. They probably would.

Mr. POLLARD. One of your inspectors from the nearest point would be sent to get a sample of the goods, would he not?

Doctor WILEY. Oh, yes. We can go on with the present appropriation, so far as that is concerned. We are not making any complaint of that.

Mr. HEFLIN. You can not do as much work?

Doctor WILEY. We can do as much as we are doing now.

Mr. POLLARD. Have the States generally followed the example of the Government in enacting pure-food laws?

Doctor WILEY. About twenty of the States have adopted the pure-food law letter for letter, almost without change.

Mr. POLLARD. They have?

Doctor WILEY. And almost as large a number have adopted the regulations and standards.

Mr. POLLARD. In this area here that is not covered by laboratories and inspectors, are the States in that territory equipped with a pure-food law?

Doctor WILEY. Some of them are.

Mr. POLLARD. And food and drug inspectors of their own?

Doctor WILEY. Yes.

Mr. POLLARD. So that you can cooperate with them?

Doctor WILEY. Take North Dakota. North Dakota has an excellent organization. Utah has just adopted an excellent organization; it has adopted the provisions of the national law. Montana I am not so familiar with. But those two States are in the area that you speak of.

Mr. POLLARD. That is the reason that I asked the question.

Doctor WILEY. North Dakota has for years had a very efficient organization, and now it is still more so; and Utah has just now adopted this organization. They passed their law last year. California has adopted this new law of ours almost in its entirety, and a large number of other States have done so. Indiana has changed its old laws and adopted this law with its essential regulations.

Mr. POLLARD. Has Michigan adopted this law?

Doctor WILEY. The Michigan law has not been modified, but they are executing it in the spirit of the national law. Commissioner Bird believes in the definitions and principles of the national law, and in so far as his law will permit is applying them, but they have not changed the law in Michigan since the law was passed. I am only speaking of the states that have passed new laws since this law was enacted. There are about 20 of them. Florida, for instance, never enforced a law until just now, and Georgia never had anything before but a partial law until just now. North Carolina has adopted this new law, and Louisiana has adopted it. Vermont has also adopted it.

Mr. COCKS. You have these laboratories and inspection districts established at great centers of distribution?

Doctor WILEY. At centers of distribution, and also——

Mr. COCKS. Of manufacture?

Doctor WILEY. Yes. We have them near the manufacturing but also where the goods are received.

Mr. COCKS. Received and distributed to other points; a would account for many not being in this section you have been ing about, because they all draw their goods from Denver and Minneapolis and Salt Lake, or Portland, or some place of that sort, I suppose?

Doctor WILEY. Yes.

Mr. COCKS. The whole territory in there draws all of its supplies from these points either to the east or west, probably.

Mr. LEVER. But would it not be possible for these adulterations to be made at the point of consumption?

Doctor WILEY. Yes; but we would have no control over that. The State only could control that.

The CHAIRMAN. I notice in your statement of general expenses you provide for one special agent at \$25 per month. What can you use a \$25 man for?

Doctor WILEY. May I tell you what he is doing?

The CHAIRMAN. I should be pleased to know.

Doctor WILEY. The appropriation act several years for has authorized the Bureau of Chemistry to make investigations of barley for

brewing purposes, as to its production and suitability for brewing. I suppose the wave of prohibition that is setting in will make it unnecessary to continue that after a while, but we have had some wonderful results from this work. This special agent is Doctor Wahl, of Chicago, who is an educated brewer, a graduate of a German brewing school, and we employed him to help us in the practical part of the work, and pay him \$25 a month.

The CHAIRMAN. Is he employed by a brewing company?

Doctor WILEY. No, sir; he has nothing to do with any brewing company. He is a professor in a brewing school, and has no relation with any brewing company.

Mr. COOK. Is he satisfied with that compensation?

Doctor WILEY. Perfectly.

The CHAIRMAN. He probably has some other income.

Doctor WILEY. Oh, yes.

The CHAIRMAN. I presume that would account also for these two special agents at \$50 a month each.

Doctor WILEY. Yes.

The CHAIRMAN. These are simply scientific men who are giving you part of their time?

Doctor WILEY. One of these special agents was chairman of our committee on standards and has given a tremendous amount of his time and investigation to the work for the Department.

The CHAIRMAN. Where you itemized special agents at \$10 per diem each, what was that for?

Doctor WILEY. Those were called in as experts to advise the Secretary on certain points. They only served a few days.

The CHAIRMAN. How do you provide for the traveling expenses of your regular agents? Do you allow them a per diem or do they furnish vouchers?

Doctor WILEY. They furnish vouchers and sworn accounts. They have no commutation for expenses. They just send in vouchers for their actual expenses under oath.

Mr. HAWLEY. Are the manufacturers of many proprietary compounds trying to evade the law?

Doctor WILEY. I do not know of any. Very few. The provisions are very simple in regard to them. They are simply required to state on their labels the proportions of alcohol and opium, etc., which the compounds contain. We do find a lot that are coming into the country from foreign countries which fail to state these things, and also a few in this country. We have a number of cases. But the great majority of the proprietary remedies, and the Proprietary Association of America have adopted the law in toto and conform to it.

The CHAIRMAN. Outside of the enforcement of the food and drugs act, have you closed any investigations you have been conducting—completed them?

Doctor WILEY. No, I do not think of any except those experiments in regard to the manufacture of syrup in the south. We have closed those.

The CHAIRMAN. And we are clear of that business now, are we?

Doctor WILEY. Entirely. We demonstrated all that we undertook to demonstrate to the satisfaction of everybody.

The CHAIRMAN. What was that?

Doctor WILEY. We had two purposes. The great trouble with the making of the cane syrup in the South and the sorghum syrup—and in the North also, but especially in the South—was fermentation in the summer time. They could make a syrup and keep it over winter without trouble, but when it went out into the warm weather it would ferment, and a great loss occurred to the merchants and farmers. To avoid that they thought it was necessary to use some preservative to prevent the fermentation. We undertook to show them by practical demonstration that a good article of syrup could be made without the addition of anything to the juice at all, not even lime, and that it would keep indefinitely if properly put up, and we did that. We had three seasons' work, and I think that is enough to demonstrate it. We did not even add lime for clarification. By heat and filtration we made a fine syrup, a little darker than the ordinary syrup which was sulphured, but with a beautiful flavor and color, and we put it in sterilized barrels and stopped them with a sterilized bung, and I have a barrel made three years ago, which has passed through the hot summers, and it is just as sweet as when it was put up.

Mr. HAWLEY. When it is drawn from the barrel in the summer and exposed to the heat, does it not sour?

Doctor WILEY. Yes, but not as long as it is in the barrel. The barrel was steamed with hot steam for a long time, and then the syrup was put in hot so that there could not be any fermentation. There is no fermentation without germs.

Mr. HAWLEY. If you took it out now would it not ferment?

Doctor WILEY. Not what remains in the barrel. By placing a little valve in at the top with a plug of sterilized cotton so that when you draw the syrup off through a spigot the air is filtered through the sterilized cotton, and you can draw it off a pint at a time, and it will keep perfectly sweet.

The CHAIRMAN. To what extent has that been adopted by the manufacturers?

Doctor WILEY. Many of the manufacturers in Georgia have adopted it.

The CHAIRMAN. You consider that experiment a success?

Doctor WILEY. Absolutely a demonstration.

The CHAIRMAN. What use was made of the plant which you had for that experiment?

Doctor WILEY. The Congress of the United States gave it to the State of Georgia. They gave the plant to them to be used by their experiment station. It cost about \$22,000, but as we could not sell it to any advantage at all, and it could be used to great advantage by the State of Georgia, Congress gave it to the State of Georgia.

The CHAIRMAN. Have you completed any other experiments?

Doctor WILEY. I would like to speak about several others we are about to begin.

The CHAIRMAN. I was going to let that follow. Have you finished any others?

Doctor WILEY. There are no others that are finished. They are like Tennyson's brook, they go on forever.

Mr. McLAUGHLIN. Are you having some difference with the manufacturers of the sweet pickles, in the matter of a preservative? I have heard from some of them that you have condemned the pre-

servatives they used. One of them said that you promised them a substitute, but had not given it to them yet.

Doctor WILEY. The first accusation, that I have condemned their preservatives, I will plead guilty to. As to the second one, I think the gentleman made a misstatement.

Mr. McLAUGHLIN. What was the preservative, formaldehyde?

Doctor WILEY. No, sir; that was alum principally, in pickles, and benzoate of soda. The fact is that some manufacturers are making pickles better than ever before, and not putting in any of these things.

Mr. McLAUGHLIN. What was the effect of those things you were speaking of?

Doctor WILEY. Both of them, in my opinion, are injurious to health. The experiments I have made have fully convinced me of that.

Mr. COCKS. That is, you mean benzoate of soda? Is that included?

Doctor WILEY. Yes; our bulletin is in the press and will be out in a few days, distinctly condemnatory of benzoate of soda.

Mr. McLAUGHLIN. You spoke of their manufacturing these sweet pickles without the use of a preservative.

Dr. WILEY. Yes.

Mr. McLAUGHLIN. Where is that being done, and how generally?

Dr. WILEY. A large number of firms is doing that; The Columbia Preserving Co. of Indiana, Heinz of Pittsburg, and Hazzard of New York, and Sprague and Warner of Chicago, are doing that.

Mr. McLAUGHLIN. Are they also manufacturing catsup without preservatives?

Dr. WILEY. Yes sir, a great many of them are making it without any preservative.

Mr. COCKS. Will it stand up?

Dr. WILEY. It will stand up any reasonable time; any time that is reasonable for the use of it. I have just had a letter, last Saturday, from Mr. Loudon of Terre Haute, one of the largest manufacturers of catsup in Indiana, who said that he had finished his experiments in making catsup, and he had made catsup without any preservative that he had kept thirty days in a room with a temperature near 100° Fahrenheit, without any fermentation.

Mr. McLAUGHLIN. Does your bulletin give suggestions and experiments for the manufacture of pickles without preservatives?

Dr. WILEY. No sir, our bulletins are mainly research bulletins on the effect upon health. They are not technical bulletins.

Mr. McLAUGHLIN. Now, as to my question of a moment ago. I said that some of the manufacturers say that when you condemned their preservatives you said something which they took as a promise, perhaps, that you would supply them something as a preservative that would not be harmful.

Dr. WILEY. They misunderstood what I said. I said I could demonstrate to them that they could make it without preservatives; but I did not need to do that, because the manufacturers themselves then went ahead and made it on a large scale without preservatives.

Mr. McLAUGHLIN. Does it cost any more to make it in that way?

Dr. WILEY. You have to be more careful in your selection of materials. You can not make a catsup out of rotten tomatoes or out of the skins and cores of tomatoes that will keep easily unless you use a preservative. When some of the largest manufacturers in the coun-

try are making it without preservatives to the amount of hundreds of thousands of dollars' worth, it is hardly worth while to go any further in the way of laboratory demonstration.

Mr. McLAUGHLIN. I understand that recently there was a convention of these manufacturers at Chicago, and that they took up this question of the action of the Department in condemning their preservatives, with the idea of bringing it before you and then asking some legislation on the subject. Do you know anything about that?

Dr. WILEY. Yes; there was a convention of that kind.

Mr. McLAUGHLIN. Within three months?

Doctor WILEY. Yes, I think it was in December; November or December, of last year.

Mr. McLAUGHLIN. Yes.

Doctor WILEY. Well, any resolution of a convention does not have anything to do with the actual facts of demonstration.

The CHAIRMAN. Is it not true that the question as to whether or not benzoate of soda is an adulterant of these articles of food, which should be eliminated, has been taken up to the President, and has he not appointed a reference board to which these questions are to be referred?

Doctor WILEY. I believe that is the case; yes, sir.

The CHAIRMAN. So that the question is still open, so far as the decision of the Government is concerned?

Doctor WILEY. Yes.

Mr. McLAUGHLIN. What I meant was, is there not some branch of the work where the manufacturers have not discovered the remedies which you say they have in other branches; I mean sweet pickles particularly?

Doctor WILEY. A great many manufacturers will say that they can not make sweet pickles and catsup without a preservative, but that has nothing to do with the fact. Both are made without a preservative in immense quantities; so that the statement that they cannot be so made has no value at all. It is simply contrary to fact.

Mr. HEFLIN. Is there not a coloring they use to make the green tomato red?

Doctor WILEY. Without waiting for the law they have all quit using artificial color. I do not think a manufacturer in the country uses artificial color to-day.

Mr. HEFLIN. It used to be done?

Doctor WILEY. It was done repeatedly and constantly in former times.

The CHAIRMAN. Before taking up your new work, suppose you let us know whether you have accomplished any interesting results along old lines of study besides those you have mentioned.

Doctor WILEY. We have prosecuted our investigations into the dairy chemistry very vigorously. The Bureau of Chemistry by law is made the referee in regard to all chemical questions of renovated butter. The analyses of renovated butter for the revenue law are referred to us. We have made some most interesting investigations in that line. I want to call the attention of this committee, because you represent the agricultural interests, to a very grave danger that our butter makers are falling into. The Secretary of Agriculture and the Secretary of the Treasury, who make the regulations for renovated butter, recommended that if butter contains more than

16 per cent of water it should be deemed to be adulterated. That is a wise regulation. I am inclined to think 16 per cent is a little too high, but at least no one should complain of it.

But there is a tendency now—and that fact can be testified to by competent men who have investigated it—in the creameries to use a new mechanical process to put just 16 per cent of water in butter, whereas butter made naturally does not have over from 12 to 14 per cent. They think now, the limit having been fixed at 16 per cent, they can come just as near that as they can, and thus sell 2 pounds more of water to every 100 pounds of butter; and some warning ought to be given in regard to that. That is adulteration, even if it does not go beyond the strict letter of the law. Whenever you incorporate more water in butter than is in butter naturally, that is adulteration. That standard was fixed for renovated butter and was not necessarily intended for butter in general. Now, whenever they find a renovated butter with over 16 per cent of water, they put a 10 per cent tax on it.

Mr. McLAUGHLIN. I did not catch what you said.

Doctor WILEY. Whenever the Bureau of Internal Revenue finds a renovated butter with over 16 per cent of water in it, they tax it 10 cents a pound under the law, and they are applying that now to butter in general, and this has been taken up by the States and that law has been applied to straight butter, although it was not originally intended to be so applied; but they have taken advantage of it. I do not know this, I have not seen it, but I have had it described to me by inspectors. They say that they have a new churning process for butter which will mix it with whey or water, and thus incorporate about 2 per cent additional of water in the butter.

Mr. COCKS. Can you tell me about what process they use for making renovated butter?

Doctor WILEY. It is a very simple process. It is made out of the spoiled butter that you find around country stores. That is melted and thoroughly washed with water and salt until the rancidity is washed out, and then it is churned with a little fresh cream, and it makes a very good butter. I have nothing against renovated butter. It is good butter. It is simply butter that has been worked up in this way.

Mr. HAUGEN. It is clean, is it not?

Doctor WILEY. Yes, much cleaner than it ever was, when they get through with it; but at any rate there is a tax on renovated butter, and it is all made under the supervision of the internal-revenue bureau, and if it has over 16 per cent of water there is an additional tax of 10 cents a pound placed upon it. We have conducted these investigations, Mr. Chairman, so that we can distinguish renovated butter easily, there is no question about it, from genuine butter, and that is one of the principal lines of work in that direction.

Mr. McLAUGHLIN. In addition to this 10 cents a pound tax that is charged on butter that has more than 16 per cent of water, there is also a penalty for making and selling it?

Dr. WILEY. Under the food law there would be, and possibly under the revenue law too. Under the revenue law there is surely a tax, but under the pure-food law it would be an adulteration, and could be prosecuted.

Mr. HAUGEN. I see in Iowa quite a number of manufacturers have been held up for this tax.

Doctor WILEY. Yes.

Mr. HAUGEN. Now you say they have devised a means of mixing water with the butter?

Doctor WILEY. Yes.

Mr. HAUGEN. In the manufacture of all kinds of butter it has to be washed with water?

Doctor WILEY. Yes, that is the regular process of making butter. Butter has from 12 to 14 per cent water, normally. When made and washed that is its normal content. I understand they have a beating apparatus which beats the butter up that way after it is manufactured and mixes it with water. That is the thing I am speaking of, not the normal cleansing of butter.

I would like to say just a word further in response to that question about progress. We have made a great many experiments this year with the drying of fruits, with the idea of showing the fruit dryers how to get rid of that very objectionable substance, sulphur dioxide. Nearly all experts agree that it is a poison for animals as well as vegetables. In the great smelting case in Utah it was shown that trees fifteen miles away from the smelter were killed by the fumes in the air. One part in one million was sufficient to kill trees.

The CHAIRMAN. We have a great many big smelters about the town in which I live, and that is our observation, that the fumes destroy the vegetation for a great distance around.

Doctor WILEY. That is undoubtedly true.

The CHAIRMAN. But the men who work in those smelters and who must be constantly inhaling those fumes are healthy, and men who have been workers in the smelters for years are more healthy than men in almost any other occupation.

Doctor WILEY. The smelter men get less of it than anybody else, because the fumes go up the big chimney and are blown away. They do not get in the smelter.

The CHAIRMAN. If you handled a smelter very long, you would know that the fumes of the sulphur are in the smelter all the time.

Mr. Cook. I must be laboring under a misapprehension in regard to the smelters the chairman speaks of. The smelters that handle great quantities of ores in my country I believe I know something about. The men working around what we commonly call a lead smelter are subject to what is known as lead and arsenic poisoning. Take it in Leadville, for the past twenty-eight years, from my own experience, there is hardly a man who has worked in one of those smelters that did not contract that disease. I have seen men so crippled up that they could not bend their fingers, and they are in that condition today, from lead and arsenic poisoning. Therefore any statement made that a man does not absorb these poisonous substances working around smelters is a very great mistake.

The CHAIRMAN. I was referring entirely to zinc smelters, and the ores we handle are about 20 to 27 per cent silver. I realize, of course, that lead would have the effect that Mr. Cook mentions. There is no lead there, but a large proportion of sulphur which is driven off in the process of smelting, and one can not walk through the smelters without having the odor of it constantly in his nostrils, so that I assumed that the men must inhale a great deal of it, and I wondered why it was held to be so poisonous to men when that has not been the experience of our people.

Doctor WILEY. If you have not already received it, I will send to you a bulletin giving the results of our investigations, and I will say that our investigations are borne out by the results of the imperial board of health of Germany, which have just been published, bearing out our results in every particular as to the injurious effects of sulphur dioxide.

The CHAIRMAN. What becomes of the old theory that sulphur is a good medicine?

Doctor WILEY. That is sulphur itself. It is true, too, that sulphur is an essential constituent of our bodies.

We have conducted very interesting experiments in drying fruits. If you could keep a good color in dried fruits without it, nobody would want to use sulphur. It is used simply to preserve the beautiful color of the fruits. We are drying fruits now that you can hardly tell from the sulphured fruits, and with perfect success. If you take the fresh fruit and before drying expose it to steam for a few minutes, you kill the oxidaze. You know how quickly an apple will turn brown. That is due to an enzyme called oxidaze. If you kill these enzymes, the fruit will come out perfectly pure and white. You can dip the fruit into a 2 per cent salt solution, and that has the same effect, and unless you knew the salt was there, you could not taste it. When I tell you there is a little salt there you may taste it, but it rather improves the fruit than otherwise, and I think we have demonstrated that so far as preserving color is concerned the use of sulphur is wholly unnecessary in fruit drying.

The CHAIRMAN. Have you gotten any manufacturers to follow your methods?

Doctor WILEY. We are just preparing this for publication, but we took samples of fruit we dried, with the fruits dried in the ordinary way, to the grocers and we would say to them: "Try these and see which you want;" and when they got this fruit of ours, with its beautiful color and delightful taste and aroma, and then when they put their nose to this other with the odor of a burnt match, they would say: "Where can we get this? We will not sell a bit of this other if we can get this." Next year we will be able to give this to them. We sent our men up to the factories in New York to work with them there in the drying season, to see how they were doing and to get samples from all these factories—half a dozen men—and we sent to California and worked with them there, finding out just what the trade practices are, and those men came back and then we instituted our own experiments and we are going to have a most interesting bulletin on that subject.

Another thing that is progressing very rapidly is our investigations into cold storage, and the effect of it upon the materials stored. We have published bulletins already on fruits, showing just how long fruits can be kept in cold storage without damage; but we are now preparing our bulletin on meat products.

Mr. COOK. How long will it be before that will be out?

Doctor WILEY. About three months. This is one investigation that we never asked Congress to authorize. It was put in by act of Congress without ever consulting us at all, and it was a very wise thing to do, and it was a most necessary thing to do, in my opinion. We can now tell a cold storage egg without asking whether it has been kept in cold storage.

Mr. BEALL. We can do that.

Doctor WILEY. And we can tell a cold storage chicken and a cold storage fish, and if you put it under the microscope or into a chemist's crucible, you can tell again, because there are changes going on all the time of a most marked character.

The CHAIRMAN. You will be able to publish those results shortly?

Doctor WILEY. We will publish them in a short time.

The CHAIRMAN. Can you tell a new egg from an old one?

Doctor WILEY. Yes; anybody can do that, because they change in a few weeks.

Mr. HEFLIN. Is not the yolk of the fresh egg very yellow?

Doctor WILEY. Yes; and the white is very white; but they change in their chemical character, showing a change in the product.

The CHAIRMAN. Will you not anticipate a little the publication of your bulletin by telling us about your cold-storage investigations in regard to meats?

Doctor WILEY. General experience shows that meats up to a certain time improve, and that up to a certain time game decidedly improves.

The CHAIRMAN. What is that time?

Doctor WILEY. For meats it appears to be about six weeks and for game and poultry perhaps three months; but for fish and eggs no time. They immediately begin to deteriorate. That will be of great practical value as a guide to people who are using the cold storage—who want to use it legitimately for the people. I think cold storage is one of the greatest blessings that has ever come to us for the handling of foods, and we are simply trying to show how to avoid abuses of it by these investigations.

The CHAIRMAN. Have you made any investigations as to the effect of different degrees of cold?

Doctor WILEY. Yes, sir; all the way from 32° to down below zero, and we have further investigated the effects of storage on the drawn and undrawn chicken for two years.

The CHAIRMAN. What are the results?

Doctor WILEY. I do not hesitate to tell the committee that it is decidedly in favor of the drawn chicken. But up to a year we could not tell any difference. After that the difference is very marked.

The CHAIRMAN. Do you mean to say that until they had been in cold storage a year you could not tell the difference between a drawn and an undrawn chicken?

Doctor WILEY. Not from the taste and flavor. We have a jury which does not know what these chickens are at all, and up to a year they would confuse the drawn and the undrawn; some of the jury would say this was better and others would say that that was better. We bring the chickens on and they are cooked all the same way in separate pans, so that there is no communication between them, and they are cooked just alike. The jury examine the appearance inside and out, and then they examine the taste and flavor, and each time we serve a fresh chicken of the same size and cooked in the same way, but no one knows beforehand which is which.

Mr. HAWLEY. Might there not be some difference in the natural flavor of the chickens?

Doctor WILEY. Yes; and that you must allow for; but there will be no such difference as this. Up to three months the jury would be confused between the fresh and the cold-storage chicken, but after

that the jury easily distinguishes between them. Yesterday the jury said No. 1 was the best, and No. 3 was the worst. No. 3 was the undrawn chicken eighteen months or more in cold storage, and No. 2 was the drawn chicken, and that was better than No. 1; but they were both very bad. No. 1 was the fresh chicken. At the end of two years they are not good to eat, but the undrawn one was much worse than the other.

Mr. POLLARD. Did I understand you to say they had been in cold storage two years?

Doctor WILEY. Yes, nearly. We put these chickens in ourselves, and they are all alike, as nearly alike as we can get them.

The CHAIRMAN. Where would you place the limit of time that cold-storage chickens could be kept?

Doctor WILEY. Without waiting to sum up all the evidence I have, I would say that a chicken could be kept three months without any appreciable deterioration, and six months in reasonably good condition, and it is not necessary to keep them, as a rule, longer than that.

Mr. POLLARD. There is another thing brought out here of extreme importance to the agriculture of this country, and that is that eggs begin to deteriorate immediately when they are placed in cold storage.

Doctor WILEY. Yes.

Mr. POLLARD. The egg industry of the country has practically been built up since the invention of cold storage.

Doctor WILEY. Perhaps I had better explain. I did not mean that the deterioration began so as to be immediately perceptible; but rather that they never improve. Certain things like fruits and meat and poultry and game improve, but I did not mean to say that eggs deteriorated at once, but, rather, that they never improved. They are best when they are fresh, and the same is true of fish. But for two or three weeks or even longer you would not be able to detect any appreciable difference at all.

Mr. HEFLIN. How long could an egg be preserved in cold storage so that it would be good for food?

Doctor WILEY. If you were going to scramble it and eat it at a restaurant, you could keep it a year.

Mr. HAWLEY. We have a good fish on the Pacific coast—the Chinook salmon—and when I eat it here it has a very different taste.

Doctor WILEY. You get it in about ten days here.

Mr. HAWLEY. Yes.

Doctor WILEY. Everybody says they are best when they are fresh caught. Of course they are excellent fish.

Mr. HAWLEY. What is the change that takes place?

Doctor WILEY. Both chemical and histological changes. The change in the histology; that is, the microchange in the tissues, is most interesting. You can begin to trace the breaking down and eating away of the muscular tissue; first the connective tissue disappears, all goes, and the fibers hang flabbily together, and then they begin to disintegrate, yet they are frozen solid all the time.

So far as old cold-storage chicken goes, it has no fresh flavor. It has a bad flavor due to deterioration; but I mean that it has no real flavor of the chicken. It is the same with the fish, and fish also is in danger of developing ptomaines, which are not so common in flesh and fowl, but in fish is especially common.

(At 12 o'clock, m., the committee took a recess until 2 o'clock p. m.)

AFTERNOON SESSION.

The committee met at 2 o'clock p. m., Hon. Charles F. Scott (chairman) in the chair.

**STATEMENT OF DOCTOR HARVEY W. WILEY, CHIEF OF THE
BUREAU OF CHEMISTRY—Continued.**

Doctor WILEY. Mr. Chairman, I will proceed with an account of some of the experimental work we have done looking to the preservation of fruit juices in the unfermented state. I think we all recognize the great food and hygienic value of unfermented fruit juices. It may be our opinions about the fermented article differ, but I think we are all a unit about the unfermented, and especially is it recommended by physicians in various forms in dyspeptic troubles. A gentleman called at my office last fall who had been spending the summer at the springs in Germany, and his physician had advised him to drink sterilized apple juice over there, and he did so with great benefit to himself, and he came into my office to see if he could get that kind of apple juice in the United States, and I referred him to a member of your committee, who had made some experiments in that line, and he corresponded with him. Of course his physician told him not to drink any apple juice kept with any kind of preservative.

Last year we made, in collaboration with one of your fellow-members here, a series of experiments in the preservation of apple juice, and this year we have carried it on to a still greater extent in Washington. We have also gathered data respecting the preservation of fresh grape juice. That already having been done on so large a scale commercially, it did not seem to be worth while to do any experimental work on it.

The CHAIRMAN. Most of the grape juice on the market is without preservatives?

Doctor WILEY. I think so now, sir. I think the greater part of it is without preservatives. But it is not so with apple juice. There is very little if any sterilized apple juice on the market. Our object was to see if we could produce without any unreasonable expense a sterilized juice, or pasteurized juice is perhaps a better term, because if you heat any fruit juice up to the boiling point of water, which is the sterilizing point, you change to a certain extent its flavor and possibly some of its constituents like albumen, whereas, if it is heated to a temperature sufficient to destroy the alcohol producing fermentation, it does not produce so marked a change, although some little change is produced, in the flavor of the finished article. This process of pasteurization is called after the eminent scientist Pasteur. The boiling of the juice ought also to be called by the name of the discoverer of that process, the French scientist Appert, who a number of years ago, more than a hundred, observed that if you boiled liquids at a certain temperature they would keep without preservative. That was the beginning of sterilization, which ought to be called appertization, if the other process is called pasteurization.

One reason why you can not put fruit juices in tins is that the juices act in a very positive way upon the tin, and the flavor of the tin is imparted to the juice, and the solder is dissolved, and the tin is

corroded, and hence any effort to preserve in tin, while the results is perfect as far as the preservation is concerned, is highly objectionable because of these facts.

Mr. POLLARD. What is there about the acid of the cider that makes it have a bad effect on the tin more than the acid of tomatoes or any other kind of fruit or vegetable?

Doctor WILEY. The acid of the cider is chiefly malic acid, and for some reason, I do not know what, it seems to act upon the tin to a greater extent. Tartaric acid and citric acid do not seem to act so vigorously.

Mr. POLLARD. The malic acid of the cider does not have any effect on the tin as long as the can is not opened. It is only when it is opened that the action takes place.

Doctor WILEY. We find that marked erosion and those etched figures on the tin immediately on opening a can, and it is due to electrical and chemical action. If the tin was absolutely pure, there would be no action, but as the tin has other metals in it they set up a number of electric couples, small electric batteries, and that causes the effect of the acid, the erosion of the metal. We have, therefore, used a coated tin can, coated on the inside with a gum which protects the tin from the acid.

Mr. POLLARD. What is it that you call the coating?

Doctor WILEY. I do not remember just the exact name that is applied to these coated cans, but they are protected by this coating of gum. But that has nothing to do with this case. We find that of course cider put up in this way and properly pasteurized, say at 150° Fahrenheit, keep the best. We never yet have had a can spoil which was heated to 150°. We put the juice into these cans before they are heated, and then we put them into a bath, and we have one can with a thermometer stuck into the can in the center of the bath, and when that thermometer shows 130° we know that all the cans have reached that degree of heat and we stop the heating.

Mr. HAWLEY. You seal them before heating?

Doctor WILEY. Yes., I think at 150° you would not lose a can in 1,000. Of course the larger the can the more care you must exercise and the more carefully you must heat the bath. The best way is to always have a trial can with the thermometer in it in order to be sure of your temperature. Now, there is a little change of taste in this, but you would never notice it unless you had the fresh cider with it; then you can tell. This cider I have here was made on the 16th of December of last year. This is just pasteurized.

Mr. POLLARD. I would like to know whether you have done anything along the line of counteracting the change in the taste of the cider?

Doctor WILEY. I do not see how we can do that.

Mr. POLLARD. I find that one of the first things we have to meet with people who know what cider is, the sweet juice, is their objection to the change in the flavor. The first thing they think is that there is some adulteration, and they object to it on that account. They object to that change from the natural flavor or the natural aroma that is caused by heating.

Mr. HAWLEY. When you open a can after it is boiled and has stood as long as this can you have here has, do you find any sediment in the bottom of it?

Dr. WILEY. We have never noticed any sediment in the can, but Mr. Pollard says that when it is put in bottles you can notice it in the bottles.

Mr. HAWLEY. Do you filter the juice before it is put in?

Dr. WILEY. No, but that could be done; and that makes a much brighter juice.

Mr. POLLARD. Was this juice treated in any way?

Dr. WILEY. No, only run through the centrifugal machine.

Mr. POLLARD. Through the separator?

Dr. WILEY. Through the separator.

Mr. POLLARD. More than once?

Dr. WILEY. No, only once; some of it twice. When this cider is pressed we put it through a separator just as you put milk through a separator, and we get out of the cider a lot of stuff, mud and gum, and we do that before we pasteurize it.

Mr. HAWLEY. That probably accounts for the lack of sediment in the can or bottle.

Dr. WILEY. The more you can get out the less sediment you will have; but you cannot get it all out except by filtration under pressure. That is more expensive. Filtration is rather a troublesome way of preserving the juice. These cans cost something, and we have experimented now in putting the cider in barrels, and I wanted to subject it to as severe a test as possible and so we used fresh barrels. Usually we use whisky barrels after whisky has stood in them for awhile, and no germs are found in them anywhere, and they are ideal receptacles for pasteurized cider.

Mr. LEVER. Is whisky a germ destroyer?

Dr. WILEY. Yes; the germs can not live in alcohol.

Mr. LEVER. That is a good thing to know.

Doctor WILEY. I hope that will not affect the dispensary in your State.

The CHAIRMAN. How do you sterilize it when you put it in barrels?

Doctor WILEY. This (showing the cider) was put in on the 13th of November, and it was drawn out to-day. This has been a warm winter, and we just had it in an ordinary cellar. There has been no cooling of it.

The CHAIRMAN. That was taken from a barrel?

Doctor WILEY. Yes, that was taken from a barrel; it was taken out to-day. That was a new barrel, and I chose that because I wanted a barrel that was not sterilized. We sterilized this barrel by simply running steam into it.

Mr. POLLARD. That removes the wood taste, too?

Doctor WILEY. Yes, that removes the wood taste to some extent.

Mr. POLLARD. I have had a little experience in trying to put pasteurized cider on the market in barrels, and our experience was such that we had to give it up. We have operated there at home, or tried to, for a number of years, to carry out the idea that you are trying to reach, in giving an absolutely pure article to the trade. That was the theory on which we were operating, and we worked at that for a number of years and the results were such that we had to quit it; it simply ruined our business. The reason is that it is next to impossible in a commercial way to get barrels that are perfectly air-tight. There will be a per cent of them that are not air-tight. We found, buying the very best barrels we could get, and nothing but whiskey barrels—

that is whiskey stock, not always barrels that had had liquor in them—we could not get them air-tight. We did try one year buying new barrels, but with the very best whiskey stock we had a loss of from 10 to 15 per cent, just enough to ruin the business for the market; and of course with the barrel that will hold the juice or will hold water, if it takes in just the least bit of air, that will make your whole barrel ferment, and you lose the cider. Cider is pretty treacherous stuff to handle, and I do not think you will find any one going into the business of handling cider in wooden packages that will make it pay, from my own experience.

Another objection to the cider in barrels is this: We use the large liquor barrels, and a very large per cent of the cider that is consumed on the market as sweet juice is consumed by the people in the country and is sold through the small grocers. We find that you cannot sell to a small grocer a package that will hold more than 15 gallons, and even a package that small may stand in his store six weeks before it is sold. If you put a 60-gallon liquor barrel in there, it simply means that two-thirds of the cider will spoil on his hands. I would like to inquire whether you have gotten a package of any kind of material that will resist the malic acid. If you can get that sort of material so that you could put cider in 2 or 3 gallon packages, then when they are opened that is not so much cider, going right to the family, and they would use it up before it is fermented. I think that is the secret of that.

I understand you to take the position that benzoic acid is injurious to health, and if this board to which the matter has been referred so finds, it is practically going to ruin the cider business of the country unless we can come in with a package other than wood to ship it in. And the next thing is that it is becoming impossible to get wooden packages. Cooperage is becoming so scarce that you can not get them.

Doctor WILEY. How do you sell your cider, in bulk?

Mr. POLLARD. Yes.

Doctor WILEY. Then is it not in wood? Wood costs just as much for the benzoic acid cider as it does for the other.

Mr. POLLARD. No, we use a much cheaper grade of wood in the cider package. You could not use that at all for pasteurized juice. This package that you put the preserved cider in is not made of the best grade of oak, but the barrel is paraffined, and the paraffin runs into the small holes and fills them, and that will hold the juice. You can not use the paraffin in the barrel that you put the pasteurized cider in, because the paraffin melts and runs all out of the barrel.

Doctor WILEY. That is easily arranged. We can put pasteurized juice into the barrel at any temperature. We use a continuous pasteurizing process and we could cool the pasteurized cider down to any temperature you like before we put it in the barrel, simply by providing an exit tube surrounded with cold water which comes down into the barrel through a bung, through sterilized cotton.

Mr. POLLARD. I do not know whether that would work or not. You have got to have the air entirely out of it.

Doctor WILEY. The air has nothing to do with it at all. You do not need to get the air out at all, if the air is free from germs.

Mr. POLLARD. That is the point.

The CHAIRMAN. The Doctor has not told us how he treats this cider.

Doctor WILEY. We pass this cider continuously through a copper

tube heated up to a temperature of 150° to 160°, and we have a thermometer sealed in at the exit, so that we can tell just what the temperature is when it comes out, and it comes through that tube into the barrel and never comes into contact with the air at all, so that it is no trouble to put it into the barrel in a completely sterile state, and you can put it in at any temperature you like by surrounding it with a cooler. I think it would be advisable to coat these barrels with paraffin and stop up all the pin holes in the package. I am not discussing the question of doing this in a commercial way. I am only showing the committee that it is possible to do it without any great increase of expense. I do not think that cider is any harder to keep than grape juice, and that is preserved in enormous quantities in barrels, and sterilized in this way. I wrote to the California Wine Association for some information on this subject, and I got this morning a letter just in time to present it to the committee. It reads as follows:

CALIFORNIA WINE ASSOCIATION,
180 TOWNSEND STREET,
San Francisco, Jan. 17, 1908.

DEAR DOCTOR WILEY: In accordance with our recent conversation in Washington, I have made inquiries in regard to the length of time the grape juice has been stored in wooden cooperage and inclose you the reply of our Mr. John D. Bosch, which speaks for itself. He refers to barrels, which are 50 gallons capacity.

With best regards, I am, very sincerely yours,

CHARLES S. ASH.

Dr. H. W. WILEY,
Department of Agriculture, Bureau of Chemistry,
Washington, D. C.

GEYSERVILLE, CAL., January 17, 1908.

DEAR SIR: In response to your query on the oldest grape juice I have now on hand, stored in barrels, would state that I have some 3 years old. Until recently, I have had some, in ten-gallon kegs, 5 years old, but have used this up.

Very truly, yours,

JOHN D. BOSCH.

Mr. CHARLES S. ASH,
Care of California Wine Association,
180 Townsend St., San Francisco.

I believe that the difficulties which Mr. Pollard speaks about can be easily overcome in practice. They are not insuperable at all, and the question is of furnishing the consumer a beverage which is absolutely beyond question in regard to its character; and the fact that physicians will not prescribe juices of this kind in which a preservative has been used shows the attitude of the medical profession in regard to it. In fact, the medical profession is practically a unit with regard to the introduction of preservatives into food products of any kind.

Mr. POLLARD. I did not get your idea, and I would like to have you explain this. Take the pasteurized cider you are going to run into a barrel. You say you cool it before you run it in?

Doctor WILEY. We do not, because we are not paraffining our barrels.

Mr. POLLARD. I would like to have you explain how you would do that.

Doctor WILEY. All that you have to do is to surround the tube through which the cider passes after it is pasteurized with a cooler, and run it into the receiving vessel.

Mr. POLLARD. That barrel is full of air?

Doctor WILEY. Yes.

Mr. POLLARD. That air is charged with germs?

Doctor WILEY. The air that is in a barrel which has been freshly sterilized and handled carefully is sterile. It is not the air that produces fermentation at all.

Mr. POLLARD. Of course.

Doctor WILEY. It is the germs in the air that produce fermentation. But when you sterilize a barrel the thing to do, and which is always done, is to put a bung in it at once so that no air can enter or come out of it until you are ready to use it. We immediately put a sterilized bung in as soon as it is sterilized. Of course we would not allow the barrel to be filled with fresh air before we put the juice in. So there is no danger of infection. We never lose any packages from that cause.

I bring these matters before the committee because the question was raised this morning about whether we were willing to show how foods could be preserved in a perfectly unobjectionable way without the use of the so-called chemical preservatives, because just so long as they are used, the question of their wholesomeness will continue to be raised. There is no use shirking the responsibility. The question will come up again and again so long as these preservatives are used; when you have a great body of chemists and physicians opposed to these things the people will never be satisfied to have them in foods, and I think the best way is just to settle the whole matter right at once.

I recognize the difficulties of a commercial character which stand in the way as well as anyone, and I believe in going gradually and methodically about work of this kind. I believe when you read my bulletin, which is now passing through the press and which contains the results of our investigations on benzoic acid and benzoate of soda, you will agree with me that they are not suitable substances to be put into foods. Every result that we got pointed to that conclusion. Benzoate of soda is converted into hippuric acid in the body just as long as it can get a sufficient amount of the material which is in the liver, glyocol, to convert it, and the rest of it is excreted through the kidneys. The whole mass of it comes out through the kidneys, either as hippuric acid or unchanged, organs that are already overburdened through our methods of living, and which any additional burden will injure, and I think there is no question that benzoic acid and benzoate of soda disturb the metabolic processes, and they certainly produce indigestion and malaise—inability to do the full amount of work which one is called upon to do—and positive symptoms of disease when used for a long time. At the same time, any healthy man can take benzoate of soda in moderate quantities for a considerable time without it having any particular effects upon him.

Mr. LAMB. What are they putting into this cider that is going out over the country?

Doctor WILEY. Benzoate of soda is what is used now almost universally.

Mr. LAMB. Are they not brought up under your pure-food act?

Doctor WILEY. As far as we are concerned the pure-food law is interpreted in such a way as to permit these chemical preservatives in moderate quantity for a limited time.

The CHAIRMAN. Up to this time you do not forbid the sale of these articles of food that have these preservatives in them?

Doctor WILEY. No. The regulation provides that all goods packed during the season of 1907 may go without hindrance into interstate commerce, provided they do not contain more than one-tenth of 1 per cent; but the object of that was to inhibit it in future years. That question is now carried up to another commission, and will be open until that commission makes its decision.

The CHAIRMAN. Who constitutes that commission?

Dr. WILEY. As I understand, it has not been appointed yet. The President is going to appoint it.

The CHAIRMAN. I thought he had appointed it.

Doctor WILEY. I do not think so. It has not been announced, at least. But another point that I wanted to bring before you was as to the experiments we have made in drying fruits. They are very interesting in many respects. The great argument for using sulphur in drying fruits is that the color of the fruit is spoiled unless you use sulphur. I have here apples [showing them] which we dried on the 9th of January after simply dipping them in a 2 per cent salt solution, and I do not believe any merchant or any consumer would object to those apples on account of their color. Here are the same apples sulphured and dried. They have not quite as good a color as those dried without the sulphur, and so far as flavor is concerned they are very inferior.

The CHAIRMAN. There is nothing in this first sample to color the fruit?

Doctor WILEY. Nothing at all except a 2 per cent salt solution. The first samples are Ben Davis apples and the second samples are Balwin apples.

The point was made that you might dry sliced fruit in that way, but you could not dry whole fruit; so we dried the whole fruit. Here we have [showing them] whole apples dried very successfully, as you can see. These were dried without dipping in salt [indicating another sample]. They were dried under the same conditions as the other, except that they were not dipped in the salt solution; but dipping in salt is far cheaper than sulphuring, so far as that is concerned, and gives at least as good a color as sulphur.

Mr. LEVER. It gives a better color.

Mr. HAWLEY. It seems to me I observe that these apples are not so hard. They do not dry so hard; the sulphur hardens them a little, does it not?

Doctor WILEY. No; I do not think the sulphur hardens them.

Mr. HAWLEY. They seem to be harder.

Doctor WILEY. It is possible. I have not examined into that point. Probably it is due to the difference in moisture. While we tried to dry them to the same content of moisture, some of them are a little drier than others.

Peaches are very much more difficult to dry than apples. There are peaches [showing them] such as are put on the market that contain per kilogram 2,110 milligrams of sulphur—that is, sulphur dioxide. We have not had any peaches to treat by the salt-solution method, so we can not tell what we could do with peaches, but they are more difficult to handle than apples. We have, however, gotten hold of fresh apricots. The apples dried with the salt are very dis-

tinctly better than the ones with sulphur, and they are not a bad color. They are a great deal better than the sulphured apples. These experiments show that so far as apples are concerned just as good a color can be secured without sulphur as with sulphur, and the flavor is very much better.

The apricots without sulphur are deeper in color, but the flavor is better. We think we could do as well with peaches as we could with apricots, but I do not believe we could make as fine a looking peach without sulphur as with it.

Mr. COOK. Does it take as long to dry with sulphur as without it?

Doctor WILEY. I do not think that so far as the time of drying is concerned, it makes any difference, except that when you use the sulphur you can leave a larger amount of water in the fruit, and you can sell a larger amount of water.

Mr. POLLARD. May I ask whether these peaches dried without sulphur had the salt application? Were they dipped in the salt?

Doctor WILEY. Those are apricots. You refer to the apricots?

Mr. POLLARD. Yes.

Doctor WILEY. Yes, sir.

Mr. POLLARD. And these peaches were also dipped in the salt solution?

Doctor WILEY. The peaches we did not try. We did not begin our experiments until too late to get fresh peaches, so that these are only to illustrate what peaches are when they are sulphured to that enormous extent that I have mentioned. It would be really dangerous for a person with a delicate stomach to eat a mess of those peaches, because of the very serious effects sulphur produces on an organism of that kind.

Mr. POLLARD. How do you get this effect with the peaches?

Doctor WILEY. They are sulphured before they are dried. That treatment makes it look more natural and more like a fresh fruit than if it is not sulphured. The results of our experiments with sulphur, which have already been published, were very decided. The sulphur diminishes very largely the number of red corpuscles in the blood. The moment you begin to feed sulphur, even in small quantities, the blood begins to lose its red corpuscles. Of course the function of the blood is impaired, and its power of nourishing the body is weakened. The red corpuscles are the oxygen-carrying bodies, without which combustion could not take place. That is only one of the serious things we have in our indictment against sulphur, but it is one of the most important and one that has never been known before.

Mr. LAMB. I thought sulphur was a good thing for the liver.

Doctor WILEY. Sulphur is good for the liver, but not in this form.

Mr. HAWLEY. I know that my mother used to fix up sulphur and sirup.

Dr. WILEY. Yes; sulphur and treacle. That is real sulphur. That is not sulphur dioxide.

Mr. BEALL. Will you have something to say about preserving fresh fruit for shipment or for storing?

Doctor WILEY. This morning I described the experiments we had conducted in keeping fruit in cold storage.

Mr. McLAUGHLIN. And for shipment?

Doctor WILEY. And for shipment, too; but the work on the shipment of fruit has been done by the Bureau of Plant Industry. They

have had charge of that. These are some of the principal points upon which we are working with the idea of gradually leading the manufacturing industries to paths where they can dispense with the use of any artificial means of this kind. The preserving of fruits by chemical preservatives is possible, simply from the fact that the preservative is powerful enough to kill the fermentative germs or paralyze them. That is the only way it can work. Now, I can not see from any theoretical condition how you can do that without introducing into the food a substance that is injurious to health. It does not seem that the two ideas are at all reconcilable, so far as our experiments have extended now, and we have been working for six years on this matter.

We commenced with borax and boracic acid, and then we took up salicylic acid and salicylates, and then sulphurous acid and sulphites, and after that we took up benzoic acid and benzoates, and then formaldehyde, and one coloring agent, copper sulphate. We have worked those through experimentally in a way that has never been attempted anywhere else in the world, and with patience and long suffering, and often repetition with parts of the work that seemed to be not very clear, in order that we might not reach any conclusion that was not fully justified by the facts. It is not a theoretical work. I will confess that my theories in regard to preservatives have been entirely changed by my work. I fully believed before I began my work that such things as benzoate and borax were entirely harmless in the quantities used, and I had no idea but what my work would lead to that result. At the same time, I kept my mind open and did not allow it to be biased by those beliefs. Also I believed that salicylic acid and formaldehyde were very injurious. I was surprised in both cases. I found those things not nearly so injurious as I had anticipated, and the things I thought not injurious I found to be injurious. They were all injurious, but they were all about in the same class. I could not easily distinguish between them so far as choice is concerned.

The CHAIRMAN. You found a cumulative effect with all of them?

Doctor WILEY. The cumulative effect is specially noticeable with borax and benzoate of soda. My bulletin brings out beautifully the lingering effect of benzoate of soda. It does not seem to act for a long while, and in that way it is different from benzoic acid, which acts promptly.

The CHAIRMAN. Manufacturers of catsup defend their use of benzoate of soda, admitting that in large quantities it would be harmful, but saying that by using it in the very minute doses that a man would get by using a very small amount of catsup with his food once a day, it would have no harmful effect whatever. What is your idea about that?

Doctor WILEY. That would be true, assuming that if a large quantity is harmful a small quantity is harmful in diminishing proportion; that is a fair inference. If the effect from one administration could be eliminated and the patient recover from it entirely before he took another dose, it might not do him any harm; but you can produce a great effect by an enormous number of small blows, sometimes more emphatically than you can by a single heavy blow, and the continued repetition of a small dose will work injury—and sometimes a greater injury—because of its insidious character. And

more than that, the remarkable fact has been developed in these experiments that while these preservatives inhibit fermentative action and decay, they do not interfere with enzymic action. The difference between the two is that the yeasts and the bacteria are living bodies which propagate their kind, while the enzyme is an unorganized ferment which is secreted by the yeasts and bacteria, which develop then in great numbers, and we find that the enzymic action which produces the most obnoxious changes in foods continues while the fermentative action is inhibited. It is just like leaving a switch open on a railroad track and taking away the red light. When anything unfit to eat ferments it produces such a condition that nature warns the man that it is not fit to eat, but by putting these preservatives in the food, we take away the fermentative process and leave the enzymes working with very harmful results, because of the preservatives destroying the signs of danger.

The CHAIRMAN. Then the fact that food is not fermented which without the use of preservatives would be fermented does not mean necessarily that it is harmless?

Doctor WILEY. No, sir; not at all. You can keep food for months, and apparently it is in just as good condition as it was in the first place. Take milk, for instance. We can keep it by the addition of a preservative like borax or formaldehyde, and at the end of a week or ten days or a month to all appearance there is no change. But when you come to examine it chemically, you find that the tissues are all breaking down, and are on their way to poisonous products. Many foods become poisonous, the proteids almost without exception, in the body. That is, the body is constantly filled with these poisons which, if they were not excreted, would in a short time destroy life. For instance, if the kidneys should cease to work for twenty-four hours, there is not a man around this table who would not be deathly sick from the degradation of the food products he eats. Therefore the whole tendency, when food starts down hill, is to develop these poisons, whether it is done outside of the body or inside of the body, and for that reason it is not safe to eat foods after they have been long kept, if they are of character of foods which decay. Foods like cereals have little tendency to decay. Nature has put them up so that they do not decay. But take milk—that is the type of a perishable food. So set now is the opinion of physiologists and chemists, and of the public, in regard to milk, that any attempt to preserve milk, which is the most perishable of foods, is frowned upon by the whole community.

Mr. COCKS. That is not true of the pasteurized milk, is it?

Doctor WILEY. That is true of the pasteurized milk. Pasteurized milk develops within a short time degradation products which make it unfit for consumption. It should never be kept more than a few days. Milk is the most susceptible of our foods to influences of an enzymic character.

Mr. COCKS. That would be true, even if it were kept on ice?

Doctor WILEY. Even if it were frozen; yes. We have kept milk near the freezing point three and four months, and apparently it was perfectly sweet, and yet upon chemical examination it would be found to be entirely unfit for food. We would find the casein breaking down and products developed which in their lower states become poisons. The steps toward that were well marked.

The CHAIRMAN. Is that what you call ptomaines?

Doctor WILEY. Yes; that is the name given to products developed from the degradation of protein.

The CHAIRMAN. Are you still working with your poison squad?

Doctor WILEY. Yes; they have a lot to do yet before we get through with this work.

The CHAIRMAN. What are you doing now?

Doctor WILEY. We are just beginning some work on the drugs put in soft drinks.

The CHAIRMAN. Have you made any experiments to test the preservatives in, or to test the condition of, meats that have been canned for a long time?

Doctor WILEY. No; we have never taken that up; but we have been asked to by Senator Beveridge and others. We have not been able as yet to take that study up on account of the magnitude of our other work, which we do not want to stop. These experiments are of interest in many respects. They are often misrepresented, as if we had gone at them with preconceived ideas which we were determined to sustain. I can assure the committee that in no case has any preconceived opinion been allowed to exert any influence whatever on our final conclusion. We can not banish prejudice, any of us; but we can, if we will, prevent our prejudice from influencing the final judgment, based on the ascertainment of facts; and that is what we have endeavored to do, and I believe have succeeded in doing. These experiments have not been undertaken for the purpose of injuring any industry or interfering with any business, but solely in accordance with the act of Congress which authorized these studies to determine the effect upon health and digestion of preservatives and colors or other matters added to the foods, and they have been conducted wholly in that spirit of trying to reach the truth and free of all prejudice or preconceived notions of what the truth might be.

The CHAIRMAN. Have you had the assistance at any point in these experiments of a doctor of medicine?

Doctor WILEY. When we first began our experiments we had a physician detailed from the Public Health and Marine-Hospital Service to examine our young men from time to time, first, before they were accepted, and then every week during the progress of the work; but as it was a little inconvenient for him to come at times, and we often had to undertake the examinations ourselves, and inasmuch as I am a trained physician, although I have never practiced much, and we have in the Bureau a number of others who are graduates in medicine, we now supervise that ourselves; but everyone of those men is subjected constantly to this medical oversight. We have, however, asked the advice of the medical profession and of the professors of hygiene and of physiology in all our leading institutions. I sent out several hundred inquiries directed to these physicians and officials of medical and health societies, the American Public Health Society, the American Medical Association, the secretaries, and presidents of State boards of health, and to many professors of hygiene and physiology in all our leading colleges and universities, and I asked them, stating the case as well as I could, and as fairly, to express their opinions on certain points. "Are preservatives other than the usual condimental preservatives, *V.*, sugar, salt, alcohol, vinegar, spices and wood smoke injurious to health,"

that was the leading question; and then there were three or four more bearing upon it.

We received replies from 251 of these gentlemen, and when we tabulated these replies of the leading medical and professional men of the country, there were only 33 who expressed a negative opinion out of that whole number. It was almost a unanimous vote that they were injurious to health, and should be excluded from foods. In that way we consulted with the medical profession and with the fraternity of physiologists and hygienists. Then I find on consulting the examinations before the English Parliament, the same consensus of opinion among medical men that drugs should be kept for disease and foods for health, and there is no excuse for a man in health putting any kind of a drug in his food; it does no good. When a man is ill, of course we realize the benefit of drugs. Drugs in time of disease or sickness may save a man's life.

Mr. LAMB. What would you specify as drugs in this particular?

Doctor WILEY. Every one of those preservatives we have studied is recognized in the pharmacopœa as a drug; so recognized in the medical profession and used in the medical profession very extensively. I believe that whatever the result of the present agitation may be and of the present application of the food and drugs act, the time is certainly coming here, as it is coming all over the world, because all countries are uniting in legislation of this kind, when it will be illegal, as I think myself it is now under existing law, to use these substances in foods except in certain emergencies where it is important—where it is necessary.

Mr. McLAUGHLIN. When that time comes you think it will add to the longevity of the race, do you?

Doctor WILEY. Undoubtedly; that must be the result of it, I think. All of you realize the great prevalence of kidney disease at the present time. I do not ascribe that solely to the use of preservatives in foods, by any means. I think if we were a little more abstemious in our habits of eating it would have a far better effect in the elimination of kidney disease than would the cessation of the use of preservatives. But it is the last straw. We are good eaters in this country, and in Germany, and in England, and our kidneys are worked to the limit all the time, and it is this additional burden that might be avoided that must be considered; and strange to say, every one of these preservatives that I have mentioned, except sulphate of copper, is excreted almost exclusively through the kidneys. Eighty-four per cent of boracic acid is excreted through the kidneys. Salicylic acid, borax, boracic acid, benzoic acid, the greater part of all of them is passed out through the kidneys. Sulphate of copper is such a deadly poison that the absorptive pores of the alimentary canal close themselves against it instantly, and the sulphate of copper comes out altogether in the feces; but with all of these other preservatives the whole burden of excretion falls upon the kidneys.

Mr. LAMB. Copper kills these bacteria?

Doctor WILEY. Yes; and it kills everything else that it comes in contact with, too. It is a real poison, sulphate of copper is. The others are not poisons in that common sense.

The CHAIRMAN. Have you anything farther, Doctor?

Doctor WILEY. I have not yet brought up the new work that we have been doing.

The CHAIRMAN. We would be very glad to hear about that.

Doctor WILEY. The Secretary has been anxious for me to do something that the farmers of the country have been clamoring for. We get hundreds of letters from farmers all over the country inquiring about denatured alcohol, and how to make it, and we have tried to answer these inquiries by issuing farmers' bulletins. Two of them I wrote and one has been prepared by the Office of Experiment Stations. They gave a great deal of information on that subject, but there is something lacking still more important, and that is a technical knowledge of how it is done, and the Secretary has authorized me now to build a small still, such as the farmers could copy, and operate it, and to invite every State agricultural college to send a man to spend two or three months with me next fall, when I can teach them to operate that still and utilize the waste materials of the farm in the practical small way that the farmers could do it, and that will give an opportunity in each State to have the knowledge spread from the agricultural college and experiment station.

Mr. COCKS. Can you describe the method you propose to use?

Doctor WILEY. We have worked it out in the laboratory now. We have made denatured alcohol from many different waste products. I have many different specimens, made from watermelons, and muskmelons, and the waste of sweet corn canneries, old potatoes and injured potatoes; and injured grain, injured by frost or storm or otherwise, and all these waste materials which might be utilized for those purposes we have worked up by fermentation and in our still, so as to get the greatest part of the alcohol out and secure alcohol of the proper strength for technical use.

Mr. LAMB. That is what you term denatured alcohol?

Doctor WILEY. Yes; the denaturing is prescribed by the law, so that it can not be used for drinking purposes.

Mr. LAMB. How to prevent them from not denaturing it is the question.

Mr. HAWLEY. How much will it cost to make this alcohol?

Doctor WILEY. That is one thing they want to know, and that is something we can tell them. I am not a novice at distilling. I erected a distillery at Medicine Lodge, Kans., and I have operated a distillery there, and my grandfather and my father were both distillers, so that I come by it naturally. But the great point, Mr. Chairman, is to know how. They have got the law, and they have got the materials, but they do not know how to utilize them. It would be perfectly useless for a farmer to put up a still and try to make alcohol without some knowledge of how to operate it, how to ferment, of what you can make the alcohol, and how you could do it; and yet if you would start the knowledge in each of the States by inviting every State that would like to send a representative here to learn, this knowledge would be diffused all over the country, and the plan, the size of the still, and the cost will be at the disposal of everybody. We are doing this under the general authority of the organic act and the appropriation bill to conduct experiments relating to agriculture. We are not asking for any special appropriation for it, but we are doing it out of what we can save out of other appropriations.

Mr. LEVER. This method of distillation is not a very intricate matter?

Doctor WILEY. No; it is perfectly simple; but you must know how to do it. A farmer could not run a still without instruction.

Mr. LAMB. They will find out down in Georgia.

Doctor WILEY. Yes; but that is not so important as to teach them how to make the fermentation.

Mr. LEVER. What I had in mind was that you were going to take three months to teach these men a very simple proposition.

Mr. HAWLEY. Do you believe that it can be utilized, so that a farmer can produce it profitably?

Doctor WILEY. I believe so. There are 7,000 agricultural distilleries in Germany. I got the French report on small stills in France, and there are 27,000 small stills in France.

The CHAIRMAN. Can you answer in a sentence how the Government inspects those stills, so as to see to it that they do not put out alcohol that is not denatured?

Doctor WILEY. That is provided for in the law. The Bureau of Internal Revenue provides for that. They have no inspection for small stills, but they take the oath of the distiller for a small still.

The CHAIRMAN. Has any way been found by which denatured alcohol could be restored to its natural condition on a commercial scale?

Doctor WILEY. Not on a commercial scale. There is no denaturing agent that you can not get out; but the cost of it is far greater than paying the tax.

Mr. HAWLEY. Suppose you ran it over again through the still?

Doctor WILEY. The denaturing substance is volatile and would come over with the alcohol. Of course some people will drink even denatured alcohol rather than go without, but those abuses will be overbalanced by the benefit of having a cheap source of fuel and light on the farm. I do not think that the farmer can make it a cent cheaper than, nay, not as cheap as the great distillery can make it, but the farmer will be using his own labor and his children's labor, and he does not have to pay out any money, and he uses up materials that would otherwise go to waste, and in that way it is almost a clear gain to him, and I believe that with the start we can give them we can help them along to secure the benefits which the law intended to give them, which up to this time have not been produced by the small still.

The CHAIRMAN. As a matter of fact there is no more denatured alcohol produced now than before the law was passed?

Doctor WILEY. There is some denatured alcohol, because they allow them to produce it; but it is all produced by the big distilleries; most of it is produced by distilleries in Peoria and Terre Haute.

Mr. COOK. Would not the cost of transportation prevent the materials from which denatured alcohol is made, these waste materials, being carried to any central point for distillation?

Doctor WILEY. Yes; it would prevent them from being carried to any central point. It would prevent them from being sent anywhere to a central point. Three or 4 farmers in a neighborhood can get together and distill, but the material is not of a nature to be transported very far.

Mr. POLLARD. You can make denatured alcohol out of rotten apples or out of pomace?

Doctor WILEY. Yes; or out of cider. One hundred pounds of apples will make about 6 pounds of alcohol—about a gallon of denatured alcohol.

Mr. McLAUGHLIN. I have seen in Michigan thousands and thousands of apples freezing on the trees—no market for them—and I suppose there are lots of other things the same way, that can be worked up by the farmer into alcohol, if he knows how.

Mr. Cook. When do you expect to be able to send out instructions as to these stills on a small scale?

Doctor WILEY. About the 1st of August, utilizing the various waste materials as they come along in the markets. Of course we will have to pay some expense for their transportation; we are not counting that. But we want to use all kinds of waste materials, melons and the waste of corn canneries, and so forth. In your State you grow immense quantities of yams and sweet potatoes, and in Colorado the white potato grows in the greatest profusion. That is what the alcohol is made of in Germany.

Mr. Cook. And apples.

Doctor WILEY. Yes, and apples; so that in each part of the country they have some particular substance from which it can be made. In the South and West it can be made from the waste from the sugar factory, perhaps the cheapest substance of all, and all through Georgia and Florida and Texas, where those small mills are working, they have not only the waste, but they have injured cane at times which they can work up into alcohol.

Mr. HAUGEN. What will be the cost?

Doctor WILEY. Of the still and outfit?

Mr. HAUGEN: Yes.

Doctor WILEY. That I can not tell until we put it up.

Mr. POLLARD. Would you admit Members of Congress to your school?

Doctor WILEY. Yes; and I would say that I have had the honor on several occasions of being a teacher of Members of Congress.

Mr. HAWLEY. There is a very appreciative committee here to-day.

Doctor WILEY. I did not mean this; but when the sugar question was up, for instance, two of the Members came down to my laboratory and learned to use the polariscope because they wanted to know when they talked about the polariscope just what they were talking about. I believe this experiment will prove of the greatest benefit to the agricultural interests of the country.

Mr. LAMB. What will be the cost of this alcohol? They will make it for 15 or 20 cents, will they not?

Doctor WILEY. It will be more than that now; but I am speaking of the fact that this raw material is not used up now. It is wasted altogether. It is not as though you had to buy it and transport it.

Mr. Chairman, I believe I have presented my case, not perhaps so quickly as I have generally done, on account of my difficulty in speaking to-day, but I have shown you the character of my work, and we do not want you to be any more liberal to us than to other people, but we simply want you to consider the needs of our work, and we leave our case in your hands with the absolute certainty that your judgment will be right.

The CHAIRMAN. We are very much obliged to you indeed.

(At 3.30 o'clock p. m., the committee adjourned until Monday, January 27, 1908, at 10 o'clock a. m.)

COMMITTEE ON AGRICULTURE,
HOUSE OF REPRESENTATIVES,
Monday, January 27, 1908.

The committee met at 10 o'clock a. m., Hon. Charles F. Scott (chairman) in the chair.

The CHAIRMAN. Gentlemen, as you will remember, the subject to be taken up this morning is the estimates for the Bureau of Soils. Doctor Whitney, the Chief of that Bureau, is here, but before calling upon him I will ask the committee to hear our colleague, Hon. O. W. Underwood, of Alabama, who desires to submit some remarks on this subject.

(Mr. Underwood's remarks will be found on later pages. See Index).

The CHAIRMAN. I now take pleasure in presenting to the committee Doctor Whitney, Chief of the Bureau of Soils, for such comment upon the estimates and the work of his Bureau as he may desire to make.

**STATEMENT OF MR. MILTON WHITNEY, CHIEF OF THE BUREAU
OF SOILS, DEPARTMENT OF AGRICULTURE.**

Mr. WHITNEY. Mr. Chairman, I had not expected to have my presentation preceded by the very able presentation which Mr. Underwood has given, yet I think it would be well for me, as there are new members on the committee, to give in a general way the whole object of the work of the Bureau of Soils.

The CHAIRMAN. I think that would be very appropriate.

Mr. WHITNEY. And after I have passed over the principal matters concerned in the Bureau I will be very glad to answer any questions, and I have brought some of the men from the Bureau, in case you want details that they are more familiar with than I am.

The object of the work of the Bureau of Soils is to study the soils and their relation to agriculture, and the first great work that was undertaken was a classification of the soils of the United States, so as to see what our national resources are for agricultural developments. You are all doubtless familiar with the very broad scope of the organization of the Department of Agriculture in the law that was passed in 1862, where it says:

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That there is hereby established at the seat of the Government of the United States a Department of Agriculture, the general designs and duties of which shall be to acquire and diffuse among the people of the United States useful information on subjects connected with agriculture in the most general and comprehensive sense of that word.

I do not know that Congress has ever enacted a statute that covers more broadly the purpose it intended than the statute passed in 1862 establishing the Department of Agriculture, for acquiring and diffusing among the people useful information in regard to agriculture in the broadest and most comprehensive sense of that word.

Gentlemen, the value of the agricultural products of the soil has reached the enormous sum of over \$7,000,000,000 per year. The grand total as reported by the Secretary of Agriculture for 1907 is \$7,412,000,000. This is \$657,000,000 above the value of 1906; it is

\$1,103,000,000 above that of 1905. The ultimate strength and welfare of the nation must be maintained by the products of the farm. The nation must be able to raise not only its own products, but, in order to get revenues and enter into the commercial life of the world, it must have products to send abroad. A knowledge of the soil, which is the basis for this wealth, is desired by every citizen who owns an acre of land. The knowledge of the soil is desired to-day by all the great agricultural colleges and experiment stations that you have endowed; it is desired by the pupils not only in the agricultural colleges, but in your lower schools. Many of the States have already passed laws requiring agriculture to be taught in their public schools. The State of Texas has recently passed such a law, and the teachers are at a loss to know what to teach. A knowledge of the soils of the State of Texas is to be given as rapidly as possible to the children whose inheritance these soils are eventually to be. They are confronted with great responsibilities; we are all confronted with great responsibilities who inherit a portion of the soil of the United States, for we not only have got to maintain ourselves and our families from the products of the soil, but we have got to pass that soil on to our posterity, unimpaired and equally capable of supporting untold ages of people to come.

A knowledge of the soils of the United States and their possible development is as essential to the nation and for the prosperity of the nation as the knowledge of any other single fact that we are confronted with. The nation is not interested in the study of the soil for the benefit of the individual. The Department of Agriculture cares nothing for the success of an individual farmer. That is a matter which the State or the county must and should consider. The Department of Agriculture is interested in the individual only as he is a member of a community, and only then as he is a member of a large community. Soil problems are not outlined by Congressional districts, nor are they outlined or separated by State lines. These great soil formations we have encountered often go over several States. The same soil problem we are studying in New York pertains equally to Ohio, to Pennsylvania, to Connecticut, and to Massachusetts.

The Bureau of Soils has surveyed and mapped about 300 areas in the United States. We have been at the work for about nine years. We have covered a total of 140,000 square miles. The work has been prosecuted and the maps pertaining to the soils have been published in every State except Maine and Nevada. The cost of this work has averaged about \$2.75 per square mile. That is about half a cent an acre. The reports of the work are shown on a large map representing the soils of the county or of other convenient district. The description of the soils is given in the report accompanying the map, and their adaptation to crops is shown. The question of market conditions as they affect the utilization of those soils is considered as well as other matters of pertinent interest. So that a person in Illinois, in Indiana, in the Canadian northwest, who wants to settle in the State of Virginia or in the State of Alabama, may write to the Department and can see from these maps and reports the character of the soils, the character of the industries that he can reasonably expect to be successful in, considering the climate, the railroad facilities, transportation facilities, the market demands, and can find out practically

all he needs to know to enable him to decide whether he shall settle there or not.

Mr. HAWLEY. You are continually extending your soil surveys, including new areas all the time?

Mr. WHITNEY. Yes.

Mr. HAWLEY. It is your plan to finally map the entire United States?

Mr. WHITNEY. Of course there is a large part of the United States that is not settled up.

Mr. HAWLEY. I mean the agricultural part of the United States.

Mr. WHITNEY. That is the purpose. This work, so far as it has been carried on, after nine years and after surveying 140,000 square miles at an average cost of about \$2.75 per square mile, or half a cent an acre, is rising in cost from year to year. The cost for the soil-survey work this past year was \$3.18. This is due to two factors.

Mr. POLLARD. That is, per square mile?

Mr. WHITNEY. That is per square mile. The two causes that are contributing to the increased cost are, first of all, the increased cost of field expenses. We used to be able to get teams in the South at very low rates. Now we have to give as much for our team hire in the South as in the North, and we have to give more much for our field expenses in the North, both in transportation through the country, and in expenses, than we ever have done before. Secondly, it is due to the fact that we have kept our men on the rolls as they have developed, and we have had to pay them larger salaries in order to keep them, in order to keep a corps of efficient men together, looking for the possible extension of the work at some future time. With any increase in appropriations you will notice an immediate decrease in the cost of the work per square mile, because with the experienced men we have now we could put less experienced assistants in the field, and so reduce the cost of the work per square mile considerably.

Now, as to the demand for these soil-survey reports.

The CHAIRMAN. Do you not think that before you pass to that you had better state briefly but succinctly what a soil survey is, in answer to a question asked by one of the members of the committee before you took the floor, or had you that in mind to take up later?

Mr. WHITNEY. I had in mind going into these details later, but I will be very glad to state that now.

The CHAIRMAN. Follow your own purpose in the matter. I did not want you to omit it; that is all.

Mr. WHITNEY. A soil survey consists in mapping the variations in the soil that are so pronounced as to indicate a difference in crop adaptation or a difference in cultural method. I shall tell you presently something more about the basis of the survey, but on our map, which is constructed on the scale of an inch to a mile, a 10-acre field can be shown, the character of the soil to a depth of 3 feet in the Eastern States, and 6 feet in the Western States, showing the character of the top soil, the character of the subsoil, noting any variations in the different depths of subsoil if any are shown. We tell the origin of the soil, what it is derived from, the drainage conditions, and whether it is in need of artificial drainage. We describe the topography—that is, whether it is a level or a rough country. That is shown on the map. We show the location of the houses, for we use wherever we can the

geological topographical sheets, so that any person can see the actual location of his house and the character of the soils on his individual farm, and can learn from the text the character of the crops to which the soil is adapted. I shall speak more at length about the utilization of these soils as I proceed.

The demand for this work is large. We have by law a thousand copies of each of the reports, each Congressman in whose district a survey is made has 2,000 copies, and each Senator from the State gets 500 copies. The Department has no mailing list for these soil-survey reports. It holds the entire number for requests that come in. The Congressman generally attends to the requests from the area itself. He has an adequate supply to send out to the farmers of the locality, so that the requests that come to the Department of Agriculture are usually from people outside of the area, seeking information in regard to the soils of that particular county. We get requests for soil surveys from all over the United States, from Canada, and from foreign countries.

Mr. POLLARD. Do not those come mostly from prospective investors?

Mr. WHITNEY. From prospective settlers, from immigration societies or organizations, and from people who want to know the character of the soils and the conditions in any part of the country.

Mr. POLLARD. As to these soil-survey maps, you made a survey in my district not very long ago and I had some of those maps at my disposal, and after looking them over I do not understand, and perhaps you can clear it up in my mind, just what good this soil-survey map will do the people that live in that section. I do not want you to get the idea from my question that I do not appreciate the value of this work; not at all. But my question is, Of what value will the knowledge of a survey of a farmer's soil be?

Mr. WHITNEY. What county is that in?

Mr. POLLARD. In Otoe County. It does not make any difference about the locality in this case. Take any locality.

Mr. WHITNEY. I shall come to that under the head of utilization. If you will wait for a short time I will discuss that feature.

I was going to say that the bureau has 20,000 requests for these soil-survey maps each year. The demands are very large, and the demands are as large for the surveys that have been made a long while ago as they are for the last surveys. In other words, it never goes out of date. People who want to go to Fresno, Cal., want the map as much as people did when it was completed nine years ago.

In the classification of the soil resources of the United States the bureau has encountered and has described 400 different types of soils, and we have here a soil-survey field book which is used, not for general distribution, but for the employees in the bureau itself, describing each one of the soils that we have encountered and the location in which they have been found, and the acreage; so that we have now by our system of bookkeeping a knowledge of how many acres of any particular soil there are in the United States, so far as our detailed surveys have gone. While this book is not for general distribution, I will say that it is being used largely as a text-book in a number of our agricultural colleges for courses in advanced agriculture, and by agricultural students in the universities, not in the lower schools. Each one of these 400 types of soils that the bureau has established is

adapted to some different kind of crop or some different combination of crops.

It is not a question, Mr. Chairman, whether you can raise corn on a soil or not; it is a question whether corn is the best crop you can raise on that soil. It is not a question only of whether corn is the best crop you can raise on that soil, but it is a question of what other crops will fit in with the corn on that particular soil. If you will notice, in the case of the natural vegetation, the growth that covers the soil in its virgin state differs. It differs not only in the fact that you have pine on one soil and oak on another, but if you will notice it more particularly you will find that the variety of the oak differs, that the kind of pine differs. Then you will notice that there are certain associations; there are crops that grow together on this soil that you will never find in exactly that same proportion on any other one of the 400 soils that the bureau has described.

In other words; the conditions in these soils, while they differ perhaps minutely, do show a difference even in our native vegetation, and they show a difference in their capacity to support crops and to support agricultural interests that will have to be studied, that will have to be understood, when the population of the United States has increased materially over what it is now. Speaker Cannon is reported to have said a few days ago that he remembers the time when the population of the United States was 18,000,000. He has seen the population grow in his lifetime from 18,000,000 to 90,000,000 of people, and he predicted that before long, possibly within the lifetime of some now living, the population of the United States would reach 400,000,000. The time is coming, gentlemen, when we can not safely depend upon the extensive system of agriculture that has prevailed.

There are many people now who know that to get ahead in agriculture, to make a success, they must understand their soils first of all. They must understand how to get the most out of them by their methods of cultivation, by their system of cropping, by their methods of tillage. So that in the soils that have been described, sometimes markedly different, sometimes slightly different, we have adaptations to different crops. We have the differences in native vegetation, which often guide us in our estimates of the possibilities of the soils for producing crops. We have differences in cultivation that have got to be considered. We have, of course, differences of topography, markets, and transportation facilities. All of these factors have to be considered in the progress of the soil survey work, and the resultant of these studies is shown in the map that is prepared, and in the report that accompanies the map. These reports describe, first of all, crop adaptation, and crops that are peculiarly adapted to the different soils. Second, they describe the cultural methods that they will need, so far as we can tell, to get the most out of them and to maintain their fertility. Then they describe the crop rotations adapted to the soils, and resulting fertilizer requirements of the different soils. These maps, in other words, give an impartial picture of the conditions necessary for the building up of agricultural industries in the several counties that have been surveyed.

The soil survey report is of interest to the farmer and the man who owns the farm, because it shows him the experience of the expert of the Department, who spent six months or nine months in the county which he is surveying, who has had an equally intimate

knowledge of the conditions in the other parts of the country which he has surveyed. The farmer gets from our men and from these reports the experience that has been had on the same soil in other parts of the United States, better methods of procedure that have contributed to success in other areas, where they have the same soils, and it gives him the best judgment we have as to new crops and new industries which can be successfully introduced. Now, it is not easy at all times to make definite suggestions as to what can or should be done. Sometimes, as in the case of our tobacco work, we think a new industry can be introduced, but it is necessary for us to become sure of it. Sometimes we know absolutely that new industries can be introduced, and the people themselves are indifferent as to whether they improve their conditions or not.

I remember the case of the survey of the Yazoo area of Mississippi. Mr. Williams, the Representative from the district, and I, had had many discussions as to whether the soil survey was of any benefit, and he thought not to his people, as he said that he had the most fertile soil in the world in the great Yazoo basin. After the survey was made I was able to point out to Mr. Williams that, as I remember it now, there was about 19 per cent of the soil of his district that he considered or would be willing to say was fine cotton soil. There was something like 67 per cent of the area that was not in cultivation—the richest soils in the world—because to prevent the annual overflows it would have required a few dikes to have been thrown up to keep the water out. As I told him, in New Jersey it would have been reclaimed. He said, "Well, what should we do with it if we reclaimed it?" I said "Grow rice." He said "Who would eat the rice?" I said "Perhaps your people would eat it." He said "No, they eat hog and hominy," and just then we met a wagon coming from town with the hog and hominy that these poor people who were working the lands in the bottoms had brought from Illinois to feed themselves, and there was not a garden, not a truck patch, that we passed in the day's ride through the Yazoo valley. They were not producing enough for their own subsistence, but were giving everything for their cotton crops.

Mr. LAMB. What year was that?

Mr. WHITNEY. Nineteen hundred and one. As we were going along we passed over a soil as we struck the bottoms, a light sandy soil, and I said, "Well, here is your great cotton soil that produces a bale to the acre." He said, "Oh, no; this is worth nothing at all." So we rode along and came to his cotton soil, and the map showed that these cotton soils that he was so proud of were narrow strips, the ridge lands around the rivers and bayous where the land was high enough to escape the annual overflows. Here is the map of the Yazoo area, and the green portion is the cotton land [indicating on map]. This portion is unreclaimed and is of no value, although it is as valuable and rich a soil as you will find in the world.

Mr. HAWLEY. How high would a dike have to be to reclaim it?

Mr. WHITNEY. These strips of land are natural dikes. They are cultivating the natural dikes and those only, and the only places where the overflow occurs are a few little breaks where the water slips through. Those could be closed and the lands could be reclaimed. There is a compact area of 50 square miles in the Yazoo bottoms which we surveyed that can be reclaimed at a very moderate cost.

Now, it was on this yellow colored area that I said, in a spirit of joke, "I suppose we are going over your cotton soils." He said, "No; these are worthless lands; we think them good for nothing. They will produce only one-third or one-quarter of a bale of cotton to the acre." When we got back from our trip I said, "Mr. Williams, do you know what those soils are? They are truck soils. They are adapted to the truck crops that are being produced along the Atlantic coast. They will produce the same vegetables that you see on these trains of cars that are coming from Texas, 1,000 miles beyond you, and are being carried through your own city up to Chicago to feed the people."

They have the most valuable truck lands and they have the climate and the conditions to produce truck. They see now that Texas is so far ahead that they are bringing their crops in train loads past their doors, and they are now developing these lands which are of no use to them for any other purpose. That is one of the lessons of the soil survey. Now I understand that those lands are being developed for truck, and I told Mr. Williams then that those were the most valuable lands of the Yazoo Delta; for when you make two bales of cotton to the acre you do not get the returns that you do when you make a thousand dollars' worth of celery or a large crop of early potatoes from the light lands that will not produce cotton. They were neglecting the finest opportunity that they had, being blinded by this great yield of, at the most, two bales of cotton, and really not averaging a bale.

Mr. BEALL. Do you know anything about the development of the fruit industry in east Texas, the fruit and vegetable industry?

Mr. WHITNEY. Yes; it has been very large and very rapid, and our work there has contributed to that. It has been largely in the tobacco district.

Mr. POLLARD. May I ask you whether you do any work of an experimental character with fruit?

Mr. WHITNEY. Only so far as this, and I should have liked, if it would not have seemed discourteous, to have corrected Mr. Underwood in some of his remarks as he preceded me. The only work that we do in fruit is to study the adaptation of soils to fruit, and beyond that we do nothing. That is to say, we can determine from our soil surveys and from our utilization work the character of the soil that is adapted not only to any kind of fruit but to any variety of fruit.

Mr. POLLARD. What do you mean by utilization?

Mr. WHITNEY. If you please, we will pass that for a moment, until we come to another part of my talk; or shall I go on with it now?

Mr. POLLARD. That is satisfactory, if you cover it later.

Mr. WHITNEY. We will; yes, sir. As to the demands for the soil-survey work, the Bureau is covering with its appropriations each year about 35 or 40 areas, usually county areas.

The CHAIRMAN. How many field survey parties have you out?

Mr. WHITNEY. We have about 15, and we cover from 35 to 40 areas. There are active petitions on file in the Bureau of Soils for over 400 areas. I say active petitions, because these are petitions for surveys that we have been urged to make, and that have been renewed and renewed within the past two or three years.

Mr. LEVER. Who signs those petitions?

Mr. WHITNEY. The petitions come to us first in the form of an inquiry as to how a soil survey can be made, perhaps a letter from an individual, and we tell them if there is any general interest we would be glad to put the application on file. That is usually followed by a petition from a farmers' association, from a farmers' grange or alliance, or from the county commissioners or some body of representative men, and usually, I may say in most cases, they have the indorsement of the Representative or Senator, or both.

The CHAIRMAN. In responding to these petitions, do you follow any definite plan looking to the gradual survey of the entire country?

Mr. WHITNEY. No, we have not.

The CHAIRMAN. You just make the survey in the direction of the hardest pressure, do you?

Mr. WHITNEY. No, we do not. We have tried so far as we are able to, and I think the maps showing the locations of the surveys will indicate to you that we have distributed the surveys very fairly in the United States.

Mr. HAWLEY. Three-fourths of them are along the Atlantic coast.

The CHAIRMAN. I am trying to get information. When do you usually make up the lists of the localities where you make surveys?

Mr. WHITNEY. I make up the list for the summer surveys about the middle of February.

The CHAIRMAN. You have not made the list for this year?

Mr. WHITNEY. No; I have not made up the list for this year.

The CHAIRMAN. Will you be kind enough to do that, and file it with this committee?

Mr. WHITNEY. I have here a tentative list which I propose to show the committee in a few moments.

Mr. LEVER. It is suggested that three-fourths of your surveys are along the Gulf and Atlantic coasts. Will you explain why that comes about?

Mr. WHITNEY. That is for two reasons. In the first place, because of climatic conditions we can mass all our forces in the South during the winter months, and when they leave the South—that narrow strip in which they can work during the winter months—when they leave that in the summer time they are spread pretty thin over the rest of the country. Fifteen parties make a pretty good impression on the Southern States and make very little impression when they are spread out over the rest of the United States. Then there is another reason. The coast region is developing now more rapidly than any other part of the country, and that refers not only to the Atlantic but to the Pacific coast. If it were possible, we ought to have more work on the Pacific coast than we have been able to do. As I remember, the two points where the greatest amount of immigration is now going on is a point in the extreme Northwest, in Washington, and in the southern part of Texas. I think those are the two that are most rapidly developing.

Mr. LEVER. Would the density of population have anything to do with it?

Mr. WHITNEY. Yes. However, on the Pacific coast, in California, that great stretch of country, you have eight Congressional districts only. On the stretch of the Atlantic coast that corresponds to that in length you have a great many more. In other words, you have a

much more densely populated country, and far more requests and stronger requests to account for the increase in the amount of work.

Mr. HAWLEY. Then the chairman's remark that your work followed the line of greatest pressure was a pretty good characterization of the plan of the work?

Mr. WHITNEY. In a way, yes; where the need of it is most strikingly shown. That is a question, of course, that I have to judge, under the direction of the Secretary of Agriculture.

Mr. HAWLEY. Would it not be rendering a very good service to the people of the country, and to the country generally also, if you were to map soils and areas that have great promise, so that people could go there and settle—people who are wanting to establish homes?

Mr. WHITNEY. Well, the work of the Bureau has been used more in, and it seems that larger demands come from, the unsettled portions or rapidly settling portions. There are great questions that are presented to the Department of Agriculture to-day for advice. There are large numbers going into southern Texas from Illinois and Iowa. They are selling their lands in those States for \$100 to \$125 an acre and going down and taking up wild lands in Texas, particularly, as a result of the railroad development, immigration companies rushing them down; but they do not know the conditions. They knew the lands of Illinois and Indiana and Ohio, where they were raised, but those lands are too expensive now, the investment has become burdensome, and we have a large number of requests from the Middle West for information as to the cheap lands of the South, and settlers are going into western Texas, where no one has preceded them, where there is nothing known, where there is no inheritance of knowledge, where there has been no information passed down as to what could succeed, and they find the soils are different, they find the conditions are different, where they have an arid climate and have to irrigate, and they have a dry climate and they have to raise crops under dry agriculture. They do not know the soils, and they do not know what to do. The cry from Texas now is, "Show these people what their soils are." Let them understand before they come here what is ahead of them, so that they can act more intelligently, and so that we can prevent, as far as we are able, the distress which is coming to a great many of them who will not be able to cope with these new conditions.

The CHAIRMAN. The Bureau of Plant Industry has a string of demonstration stations along the semiarid belt, reaching from the Canada line down into Texas—some 14 or 15 stations. Did your Bureau survey the soils upon which those stations were located before they were located, or have they at any time surveyed them?

Mr. WHITNEY. We have not been able to do that work as yet; that is, we have not been able to catch up with that movement. We have not had the parties to send out into that area, and they are urging us now to make these surveys.

The CHAIRMAN. Who is urging you?

Mr. WHITNEY. The Bureau of Plant Industry.

The CHAIRMAN. But they located their stations in the first place without any surveys?

Mr. WHITNEY. So far as I know, except possibly on the few that we have surveyed. We have a few surveys out there, but nothing like

enough. But not only the Bureau of Plant Industry in that work, but also the Reclamation Service in its work, is urging us to make soil surveys of the tracts that they are throwing open to settlement, as a basis for the intelligent planning of their agricultural development, and we have made a few of those surveys and we have on file other requests that we have not complied with.

Mr. McLAUGHLIN. At some time in your talk I wish you would tell us what kind of men are required, and the difficulty that you have in finding men.

Mr. WHITNEY. The difficulty we had a few years ago has been relieved. We are taking on college graduates who have had courses in agricultural instruction, and we have during the three or four years past placed our own men in several of the largest institutions. We have a man in Cornell University in charge of the soil department, giving instructions along the lines we need for the men we take on. We have one of our men at Columbus, Ohio, also with a course of instruction in soil work and soil surveying. We have one of our men at the Agricultural College of Pennsylvania, also giving instruction along these lines. We are sending out our own men to give courses of lectures occasionally during the winter, or such time as they can be spared.

The CHAIRMAN. These men you speak of as being at these various institutions, are they still on your salary roll?

Mr. WHITNEY. No; they have left us.

The CHAIRMAN. They have gone from you?

Mr. WHITNEY. They have gone from us.

The CHAIRMAN. I would like to bring you back, if you will pardon the interruption, to the question I asked you just now. Have you surveyed most of the farms upon which the agricultural colleges in the various States are located?

Mr. WHITNEY. That is a matter, also, that we are pushing along as rapidly as we can. We have now, I think, 20 out of the 44 experiment station farms surveyed. We have the maps, and I suppose the Secretary will transmit them eventually to Congress and ask to have them published.

The CHAIRMAN. It just occurred to me that there would be no place in the country where you could make such a survey with better assurance of its being utilized than at the experiment stations which the Department is maintaining and in the agricultural college stations which are under the direction of skilled and trained men. I think anyone must recognize that it is the extremely exceptional farmer who can take one of your maps and reports and get any benefit from it. As Mr. Underwood said this morning, the money spent in making a survey is thrown away, practically, unless it is utilized, and certainly the men who have been trained in scientific agriculture can make better use of a soil survey than the average farmer can, and it seems to me, without meaning to criticize in any way the administration of your Bureau, the places first of all where surveys should have been would be those places under direction either of the men in the various bureaus of the Department of Agriculture or of equally trained and skilled men in the various State colleges.

Mr. WHITNEY. So far as we are able we have been making these detailed surveys, and I have been anxious to assign a man to that work alone, but have not been able to take him off of other work;

so that as we have surveyed areas in which experiment stations were located we have made a detailed survey on a scale of an inch to the acre of the experiment station farm.

The CHAIRMAN. The point I was trying to make was simply this: You are able to make 35 or 40 surveys a year?

Mr. WHITNEY. Yes.

The CHAIRMAN. There are only 48 experiment stations in the United States, and in carrying the work over two years you could take care of them. There are only 14 or 15 of these dry-land experiment stations, which could have been taken care of in a quarter of a year's work, and it seemed to me that they ought to have been taken care of before any response was made to a more individual request.

Mr. LEVER. If you will permit me, my view of that is that at all of these experiment stations and agricultural colleges you will find somebody, a local man there, who is a specialist in this kind of work, and that in a measure it would be a duplication of work for the Bureau of Soils to do that work.

The CHAIRMAN. How is that, Doctor? How many colleges are able to make a soil survey of their own lands?

Mr. WHITNEY. There would not be over five or six.

The CHAIRMAN. That was my impression.

Mr. WHITNEY. And so far as this being duplication is concerned, they welcome it. They are urging us to do it, because it shows us not only what is on the station farm of Illinois, but on the farms of the Nebraska station. It shows us how the farms differ and how they compare. So that the survey being extended to all the farms on a uniform basis, it is bringing us information in regard to the agricultural experiment station farms we could not get if each one made their own survey, because there would be difference in the correlation; they would now know what the soils were on the others.

Mr. WEEKS. Where are those stations that would be able to do it for themselves?

Mr. WHITNEY. Cornell University would be able to do it, and the Pennsylvania State College would be able, and North Carolina University would be able with the instructions we have given there from time to time, and the Ohio College and the Illinois College and the Iowa College—they have one of our men—and Missouri also, with one of our men. They would all be able to make their own surveys. But even those are anxious for us to include their farms in this general system, because it will be uniform with all of the other farms.

Mr. POLLARD. I would like to inquire what reasons there are, or what reasons you have, for continuing the work along the Atlantic and Gulf coasts instead of taking up these others. There must be some good reason for it, or else you would carry on the work of making soil surveys where these experiment stations are. Would you mind stating to the committee what that reason is?

Mr. WHITNEY. It has been a question with me, and of course it is an administrative question that I shall have to decide on myself, with the approval of the Secretary, and unless Congress should direct otherwise, as to whether we should take up one interest or another. We have on file now petitions for 400 areas from the different parts of the United States. There were 154 petitions filed with me last year; that is, there were 102 original petitions and 52 renewed peti-

tions. Most of these petitions come from representative bodies of citizens, from granges, from farmers' organizations, from county superintendents, and most of them have Congressional indorsement. In the development of the work in Texas, for example, there are 46 applications on file for soil surveys in Texas; there are 21 on file for Tennessee. It has come to be recognized that in distributing those surveys the different parts of the State are going to be recognized. We are going to distribute them so far as we can in different parts of the State. Well, different parts of the State comes to mean the different Congressional districts in the State. When we take up an area in a Congressman's district which he has not indorsed, and he has a petition in that same district from an adjoining county which he has indorsed, the Chief of the Bureau of Soils is very likely to be severely handled.

Mr. POLLARD. Are these districts where the surveying parties are where they lay down on you the hardest?

Mr. WHITNEY. That is an embarrassing question.

Mr. HEFLIN. If you have petitions from two counties in one Congressional district, and one is not indorsed by the Congressman who represents that district here, and the other is indorsed by him, the Department would probably respond to the one requested by the Member?

Mr. WHITNEY. The Member of Congress represents some 200,000 people, and he is supposed to know and it is supposed to be his business to tell us what the people want. We have now petitions signed by a great many Congressmen, representative of their people, and we take those into consideration of course.

Mr. LEVER. There is no law against a Representative indorsing a petition of that kind?

Mr. WHITNEY. I have never heard of one.

(At 12 o'clock m. the committee took a recess until 2 o'clock p. m.)

COMMITTEE ON AGRICULTURE,
HOUSE OF REPRESENTATIVES,
Tuesday, January 27, 1908.

AFTERNOON SESSION.

The committee met at 2 o'clock p. m., Hon. Charles F. Scott (chairman) in the chair.

The CHAIRMAN. We will resume consideration of the estimates for the Bureau of Soils.

Mr. WHITNEY. Mr. Chairman, just before we adjourned for lunch I had stated that the Bureau is covering with soil surveys from 35 to 40 areas per year; that we have on file now active petitions for the survey of 400 areas, and I have a map here with the areas that we have surveyed shown in black, and the areas that have been requested to be surveyed, for which petitions are on file, shown in red. With our present appropriation we have ten years' work ahead of us.

I also stated that there were last year filed in the Bureau of Soils over 100 new petitions and 50 renewals, making 150 requests that were filed during the calendar year 1907; also that most of these

petitions have Congressional indorsement. It is obviously impossible for the Bureau of Soils with its present appropriation to keep up with the demands. We are now maintaining about 15 parties in the field, at a cost of about \$80,000. The Bureau needs, in my judgment, in order to comply with the requests, 40 soil-survey parties, which would cost approximately \$200,000.

Mr. HAWLEY. Might I ask what constitutes a party?

Mr. WHITNEY. Usually two men.

The CHAIRMAN. Have you enough trained men to increase your force to that extent immediately?

Mr. WHITNEY. We have enough trained men now in the Bureau to take charge of 40 soil-survey parties, and we have enough trained men in the various institutions where our own men have been teaching soils to fill up the maximum of 40 survey parties, so that there is no question now about our ability to get the men.

The CHAIRMAN. Would those men be available for this purpose?

Mr. WHITNEY. Yes; they would be available.

Mr. POLLARD. I understand you to say that you have enough competent men in your department now to equip or furnish 40 survey parties?

Mr. WHITNEY. To take charge of them; to be at the head of them.

Mr. POLLARD. May I inquire what those men who are not engaged in this work are doing now?

Mr. WHITNEY. During the summer we had out about 17 parties. Now we have out, as I recall it, 15 parties, and in the Bureau now there are men who could go out if we had the funds to send them into the field.

Mr. POLLARD. All the extra expense would be the travel expense?

Mr. WHITNEY. The extra expense would be their traveling expenses.

Mr. POLLARD. The point that I was getting at is this: I understand that you have enough men there to supply 40 survey parties. What are those men doing now? What kind of work are they engaged in?

Mr. WHITNEY. The point, from my point of view, is this: That we have men enough in the Bureau to take charge of 40 survey parties, but we would have to get assistants; that is, we would have to get 40 assistants to help the men we now have, and for lack of funds we now have more men than we can assign to the field, for the reason that during the past year especially the field expenses have been more than we have ever had, and more than we had counted on.

Mr. POLLARD. I do not know whether you understand my question or not, but you do not seem to answer it.

Mr. WHITNEY. I am perfectly willing to answer it.

Mr. POLLARD. What I was getting at is this: What are these men who are not engaged in this service now doing?

Mr. WHITNEY. The men who are competent to take charge of soil-survey parties and are in the Bureau are temporarily assigned to research work, to the preparation of material for our soil-survey work in the future.

Mr. POLLARD. If you took them out of that work, you would have to fill their places with other parties?

Mr. WHITNEY. No, not necessarily. We have men now that we could send out if we had the funds.

Mr. POLLARD. Is not this soil survey work research work?

Mr. WHITNEY. Yes.

Mr. POLLARD. What is the research work they are engaged on now?

Mr. WHITNEY. The research work that they are engaged in is work that can be done without field expenses. We do not bear their expenses while they are in Washington, and we bring them in from the field in order to save their transportation and field expenses. It is cheaper for us to have them here than to have them in the field—much cheaper.

Mr. HAWLEY. The work they are doing is necessary work?

Mr. WHITNEY. It is work that we have no need to do now. It is preparing for work years hence.

Mr. HAWLEY. By decreasing that force of 40 men to, say, 30, and taking the salaries of the other part, you could send those 30 men into the field, could you not?

Mr. WHITNEY. No.

Mr. POLLARD. I would like to find out what those men are doing now.

Mr. WHITNEY. Well, for one thing, they are getting up all the information that is available from any source as to the soils of the United States for the purpose, possibly, of getting out a generalized soil map of the United States. There is a great deal of material of that kind; there is a great deal known about the soils from the various State geological surveys that have been made. A great deal of material has already been published, and they are getting that together now because we can not afford to have them out on this detailed service of our own.

Mr. POLLARD. How many men are there engaged in that work?

Mr. WHITNEY. In Washington?

Mr. POLLARD. That is what I had reference to.

Mr. WHITNEY. I think we have about 8 or 10 men in the city now from the soil survey. We have 30 men out. Then some of the men, besides being engaged upon this research work of what has been done, have been engaged upon the collection of material as to the relations of these soils. They are working up the information that has been scattered through the literature and through our own publications. All of that work is valuable work, but it is not the work that I would keep them on if I had the money to send them into the field.

Mr. POLLARD. I do not quite understand your position. I understand you to say that you are spending \$80,000 now in this soil-survey work.

Mr. WHITNEY. Yes.

Mr. POLLARD. And that you have enough men in your department to make 40 instead of 17 soil-survey parties, if I understand you correctly.

Mr. WHITNEY. No.

Mr. POLLARD. That is, you have enough experts to put on that work, by supplying assistants, to make 40 parties?

Mr. WHITNEY. Yes.

Mr. POLLARD. You say, as I understand, that it would require \$200,000 to carry on the work under the direction of these 40 survey parties?

Mr. WHITNEY. Yes.

Mr. POLLARD. And yet you have here all the skilled men that you require?

Mr. WHITNEY. Yes.

Mr. POLLARD. You certainly would not use \$120,000 on the unskilled assistants that you would put out, and on their traveling expenses?

Mr. WHITNEY. Well, the soil survey parties cost about \$5,000 apiece. In our soil survey parties now we have two men or four men equally capable of taking charge of a party. We have trained them, they have been in our employ for years, and they are getting larger salaries than I should give to the assistants of the soil survey, and if I were able to break up our present parties and put cheaper assistants in the places of some of our more expensive men I could do a much larger amount of work at a cheaper cost per square mile.

The CHAIRMAN. Why do you not do that? Where you have two expert high-salaried men in one party, for example, why do you not eliminate one of those men and put a cheap man in his place? By doing that with seventeen parties you would have enough to make three or four additional parties, would you not?

Mr. WHITNEY. Of course if the Congress is going to limit the amount of work done to \$80,000, that is what I should do, get rid of some of them, discharge them or send them out to other lines; but I have husbanded the force and held them together and educated them and gradually increased their salaries in the hope that eventually Congress would be willing to extend the soil-survey work, and then I would have the nucleus to extend the work with.

The CHAIRMAN. There is still another point I would like a little more information on. In answer to Mr. Hawley's question you said that you had enough of these men now in the Bureau here in Washington at work whom you would put into the field if you had money to do it, and you said also that they were doing work which would eventually be useful, but is not needed for years to come. Then why would it not be good administration to discharge a part of these men, and with the amount of money that is saved put the rest of them into the field with additional survey parties, and let them catch up with the investigation work, which you say you are now carrying several years ahead of time?

Mr. WHITNEY. Of course as to that I can not decide what is best to do until I see the way the bill is to be framed.

The CHAIRMAN. But why should not you have decided last year? Before the 1st of last July you knew how much money you were going to have to expend at the beginning of the current fiscal year. If you found that you had men in your Bureau doing work that would not be needed for several years to come, why did it not occur to you to dismiss some of those men and take the rest of them and with the money that was thus saved put them into the field to do the work which you say is so pressing, and for which there is so great a demand?

Mr. WHITNEY. Here is the reason. It opens up a question that I wanted to present a little later, but which I will present now. For five years I have been urging an extension of the soil survey work to enable us to keep up with the demands. During these five years from 1904 to 1908 the appropriation for the Bureau of Animal Industry has increased from \$1,287,000, in round numbers, to \$4,182,000. The appropriation for the Bureau of Plant Industry has increased

from \$674,000 to \$1,202,000. The appropriation for the Forest Service has increased from \$350,000 in 1904, to \$2,400,000 in 1908.

The CHAIRMAN. You will pardon me if I interrupt you to say that the increases that have been made in other bureaus, even if they have been tenfold as much as they are, have not the slightest bearing, as far as I can see, on this question. It is purely the administration of your own Bureau that we are investigating now, and not the question as to whether the other bureaus are receiving too much or too little.

Mr. WHITNEY. The appropriation for the Bureau of Chemistry has increased from \$85,000 to \$697,000. Now, the appropriation for the Bureau of Soils, although both the Secretary and I have urged an increase from year to year, was, in 1904, \$212,000 in round numbers; in 1905, \$214,000; in 1906, \$204,000; in 1907, \$221,000, and in 1908, \$206,000.

Mr. Chairman, I would like to have this statement put into the record, if there is no objection.

The CHAIRMAN. We are perfectly willing to have it go into the record.

The statement referred to is here inserted in full in the record, as follows:

APPROPRIATIONS FOR BUREAU OF ANIMAL INDUSTRY.

| | |
|-----------------------|------------------------|
| Fiscal year 1904..... | \$1,287,380 |
| Fiscal year 1905..... | 1,362,880 |
| Fiscal year 1906..... | 1,540,000 |
| Fiscal year 1907..... | ^a 3,946,980 |
| Fiscal year 1908..... | ^b 4,182,480 |

APPROPRIATIONS FOR BUREAU OF PLANT INDUSTRY.

| | |
|-----------------------|------------------------|
| Fiscal year 1904..... | \$674,930 |
| Fiscal year 1905..... | 744,430 |
| Fiscal year 1906..... | 776,880 |
| Fiscal year 1907..... | ^c 1,024,740 |
| Fiscal year 1908..... | ^d 1,202,230 |

APPROPRIATIONS FOR FOREST SERVICE.

| | |
|-----------------------|------------------------|
| Fiscal year 1904..... | \$350,000 |
| Fiscal year 1905..... | 425,140 |
| Fiscal year 1906..... | 875,140 |
| Fiscal year 1907..... | 1,000,000 |
| Fiscal year 1908..... | ^e 2,400,000 |

APPROPRIATIONS FOR BUREAU OF CHEMISTRY.

| | |
|-----------------------|----------|
| Fiscal year 1904..... | \$85,300 |
| Fiscal year 1905..... | 149,800 |
| Fiscal year 1906..... | 155,000 |
| Fiscal year 1907..... | 174,180 |
| Fiscal year 1908..... | 697,920 |

APPROPRIATIONS FOR BUREAU OF SOILS.

| | |
|-----------------------|-----------|
| Fiscal year 1904..... | \$212,480 |
| Fiscal year 1905..... | 214,680 |
| Fiscal year 1906..... | 204,660 |
| Fiscal year 1907..... | 221,460 |
| Fiscal year 1908..... | 206,908 |

^a Includes meat inspection, \$3,000,000; tick eradication, \$82,500.

^b Includes meat inspection, \$3,000,000; tick eradication, \$150,000.

^c Includes cotton boll weevil, \$105,000.

^d Includes cotton boll weevil, \$150,000.

^e Special appropriation of \$500,000.

Mr. WHITNEY. Mr. Chairman, I have felt, and in this I feel that I have been supported by the Secretary, that we should maintain the greatest efficiency in the Bureau of Soils, that we would hold on to our men as long as there was any chance that Congress might see fit to increase the appropriation so that we could utilize these men that we have trained. Congress has not seen fit in the past five years to increase the appropriations of the Bureau of Soils, but the four large bureaus of the Department have had their appropriations increased enormously; all of them have doubled and several of them have been increased more than 100 per cent, and I am coming to-day, with the tacit consent of the Secretary, to once more urge that the appropriations for the Bureau of Soils be increased so that we can extend the work that the Bureau is doing, can keep up with the demands for the work, and so we can avail ourselves of this force which we have in a very conservative way educated. Every man who has come into the Bureau has been educated in the Bureau and has been prepared for the great work that the Bureau has seemed to have before it.

The CHAIRMAN. I think in this connection it would be well to put into the record the statement that in 1898 the appropriations for the Bureau of Soils were \$13,800, and for the year 1908 they were \$206,980. I question very much whether you would find any other bureau in the Department whose appropriations had been multiplied as many times in ten years as the Bureau of Soils. But I still insist that that has not anything to do with the question we are now considering. Of course Congress must be the judge of the appropriation that shall be made to any bureau, and when that appropriation is made I take it that it will be the duty of those administering it to make the best use of it they can, and I was simply asking, not in a controversial way, but for information, why it would not be good administration to drop the work which will not be available for several years, in order that we may do the work which seems to be very pressing.

Mr. WHITNEY. It has been a matter of administrative discretion, and we have taken this course and are putting it up to the Congress now as to what we shall do in the future.

Mr. LEVER. As I understand, you have reached this position: You either have to discharge a lot of your men and leave a great deal of pressing work undone, or you have to get an increase in your appropriation; is that the idea?

Mr. WHITNEY. Yes; that is it.

Mr. POLLARD. I would like to enquire whether your bureau is doing any other work aside from that which particularly relates to soil surveys?

Mr. WHITNEY. Yes; I shall come to that later. Mr. Chairman, so far as the Secretary and the chief of the Bureau of Soils are concerned, we are put in a very embarrassing situation by having more work demanded of us than we are able to accomplish, and the feeling among Congressmen lately has been that they have been unable to get any satisfaction when they come to me asking for soil surveys for their constituents. It is obviously impossible either for the Secretary or me to promise, in advance of the actual construction of our working plans, that a soil survey shall be definitely set for the

next season, and incidentally I may say that it is generally recognized now among Congressmen, I think, that they can do very little with the Department, and from what I have learned to-day, and which I have heard of from time to time during the past few weeks, they seem to think that the place for them to work is on the committee. But I would like to say at this point that I have had no part in getting any gentleman to approach the committee or to come before the committee. I have told no one more than I have told members of the committee themselves. I have not seen the petitions that were filed to-day; I have asked no one to sign them; I am responsible in no direct way for any presentations that have been made before the committee.

Mr. COOK. Just a moment. May I ask you if you include in your statement just made, in which you use the word "Congressmen," Senators?

Mr. WHITNEY. I meant to include Senators.

Mr. COOK. You used the word "Congressmen." I would like to know whether you include Senators in connection with the Congressmen.

Mr. WHITNEY. Yes; I am speaking now before the House committee, though.

Mr. COOK. You said that Congressmen were unable, I think, to do so and so. I think that was your language.

Mr. WHITNEY. Yes.

Mr. COOK. I would like to know whether your remark implied that that included Senators as well as Congressmen.

Mr. WHITNEY. Yes. I have told the same thing to Senators who come to get soil surveys, and I have put the question right up to Senators that where I can not select between members of a State delegation the Senators themselves must guide me as to the order in which the work shall be undertaken.

The CHAIRMAN. Is there not some other way except by the application of Senators or Representatives by which you could determine where it was most necessary for soil surveys to be made?

Mr. WHITNEY. Yes, I could determine that if it were left to me.

The CHAIRMAN. Do you not think it ought to be left to you?

Mr. WHITNEY. It is not. We have to face the situation. It is not left with me.

The CHAIRMAN. I would like to try the experiment of having you submit to this committee, after the appropriation has been made this year, some time between then and the adjournment of Congress a list of the surveys and where you would have them made if no Senator or Representative mentioned the matter to you at all, and see whether they could not be made there.

Mr. POLLARD. Mr. Chairman, if you will pardon me, it seems to me that Mr. Whitney is entirely wrong in this matter. This committee and the similar committee in the Senate prepare the appropriation bill to go before Congress. It is finally acted upon and becomes the law of the land. These committees act in good faith when they receive the hearings from the different bureaus of this Department, having the heads of the bureaus come before them and outline the work, and they appropriate what they think in their best judgment ought to be expended in the particular bureaus, and it seems to me that when the Secretary of Agriculture places a chief at the head of a bureau, he

ought to be the head of that bureau, of course consulting with the Secretary, and his best judgment ought to dictate where the money ought to be expended, and it should not be left to be expended in the district of that Congressman who will hound the chief the most, while the Congressman who is engaged in his other work and attending to his business in other lines and is not there at the Agricultural Department all the time hounding the chief, is ignored and the work is done in other districts. It does not seem to me that that is a proper situation at all.

Mr. WHITNEY. If the Department did not handle these Congressional requests they would be thrown into the committee.

Mr. POLLARD. That is the place for them.

Mr. WHITNEY. Or if not considered in the committee, they would be sent into the House in the shape of bills.

Mr. LEVER. The only influence that the indorsement of a Congressman has upon you is because he is a representative man and because he knows his territory, is familiar with the agricultural possibilities and the agricultural situation in his territory, and you are bound therefore to give to such a representative certain consideration.

Mr. WHITNEY. I think so; he is elected to represent his district.

Mr. POLLARD. Here is the trouble. Here are Mr. Lever and myself, for instance. He wants a survey made down in his district, and the probabilities are that it is just as important to the agricultural interests in my district as it is to those in Mr. Lever's district to have such a survey made. I am doing the very best I can to represent the agricultural interests of my district and State, being the only man from my State on the committee. I simply go ahead about my work here and trust to your judgment as chief of this Bureau to expend this money in a way that will bring the greatest good to the whole country; and because I stay away and Mr. Lever goes to see you, he gets the survey and I do not. Is there not injustice in that?

Mr. WHITNEY. Not exactly. I do not think you can look at the distribution of the soil-survey areas that has been made and charge justly any unfairness in the distribution.

The CHAIRMAN. Let me ask this question: Why do you give great weight to the representations of Representatives or Senators? Is it because you think that if you did not give consideration to their requests the appropriations would not be made for your Bureau?

Mr. WHITNEY. Not at all. I have never considered that. As a matter of fact, I know very few of the Congressional districts in which the surveys go.

Mr. LEVER. Let me ask you this question, and I submit it to the fairness of the gentlemen of this committee: Is there a department in this Government, inside or outside of the Agricultural Department, which does not give some weight to the representations of Congressmen and Senators?

Mr. WHITNEY. The rural free delivery has been established in that way. The Post-Office Department constantly confers with Congressmen. I myself have never been to a Congressman to ask him about the advisability of a survey.

The CHAIRMAN. I do not think that is the question; at least that is not the question that I have in my mind. I understand on looking over the projects that you have been working on that you have reconnoissances going on continually. You have men going over the

entire territory of the United States advising themselves as to agricultural conditions generally, finding out all they can along the line of your bureau work. Now, it seems to me that the reports of those men ought to be such as to indicate where, in what sections of the country, soil surveys are most needed, and I do not think that you would make any mistake in putting the surveys where they are most needed, even although there might be some other demands neglected.

Mr. WHITNEY. Mr. Chairman, there have been several schemes suggested to me about the conduct of the soil-survey work. Of course this is all a matter of my judgment, and I may err in the way I have distributed the surveys. One suggestion is that we mass all of our force on one particular area; for instance, take the Red River Valley, that great wheat region where the yields of wheat have been going down, and put all our force there, taking all our men out of Texas and Florida and North and South Carolina and throwing our entire force into one area or into two areas. In my judgment, it would not do. It could not be worked that way. I do not think it would be advisable to work it that way, and the actual distribution of the work of the soil survey in my judgment has been as wisely distributed as it is possible to do it. I would like to have done more work in some areas. Instead of surveying a county or a portion of a county, I should like to make a survey of the tobacco districts in the South. I should like to make a survey of the areas in which they can grow alfalfa in the South, a very important industry, with only one soil on which alfalfa can be grown successfully. I would like to make a survey of the fruit soils of the Appalachian region, one of the most important industries we have, the production of these fine qualities of apples. But I do not think it is wise. I think the distribution of these surveys has been of a very strong educational value to the people of the United States as a whole, and I will defend the distribution of these surveys and the fact that they have followed the lines of strong demands, and I am always glad to see a Congressman come in to tell me that his constituents want the soil-survey work.

Mr. LEVER. If you will permit me there, I do not wish to see you put in a wrong attitude and I do not wish to put myself in a wrong attitude. You give to the indorsement of a Member of Congress such consideration as you would give to that of any other representative citizen, and because a man is a Member of Congress it does not bind you to make your survey as he suggests it?

Mr. WHITNEY. Not in the least. Many of the surveys that the Bureau has made have had no Congressional indorsement whatever.

The CHAIRMAN. I am glad that is brought out. We all recognize the delicacy of your position, of course, in having to determine where these surveys should be made, and no one, I am sure, would deny—no one on this committee would deny—that the representations of a Member of Congress are entitled to very great weight. The only thing that I do think is important to have brought out is the statement you have just made now, and that is that your decision is not determined entirely by Congressional insistence, and that you must be working to some definite plan.

Mr. WHITNEY. We are working to a definite plan, and the only way we have gotten up a field book describing the soils of the United States has been because we have distributed these surveys as wisely as we can. We have been following out with a definite purpose the

great soil formations—agricultural districts of the United States—and I have kept that in mind always in spite of any Congressional representations whatever.

Mr. LAMB. I noticed by that map you had two counties in my district surveyed. I have never asked you to have those two counties surveyed.

Mr. WHITNEY. I am very glad to have you make that statement, sir.

Mr. LAMB. I have never asked you to do it, although I have been on this committee for twelve years.

Mr. LEVER. You have had two counties surveyed in my district, and I do not think I asked you to do it.

Mr. HAWLEY. Who has the final determination about the surveys—yourself or the Secretary of Agriculture?

Mr. WHITNEY. The Secretary, of course.

Mr. HAWLEY. You recommend to him what shall be done?

Mr. WHITNEY. Yes.

Mr. HAWLEY. And he decides?

Mr. WHITNEY. Yes. If you please, I will bring in here a list of assignments by States only, for this coming summer. We have been virtually pledged to certain things. Gentlemen, this is a very important question, and I want to consult very freely about this matter, because I am in a very embarrassing position and it is an embarrassing thing to speak to a committee of Congressmen on. I have virtually pledged soil surveys of 16 areas for this coming summer, if it is possible for us to cover so much territory. I want to survey one district in Maine; that is the great potato district of Aroostook County. Aroostook County is as large as the State of Massachusetts. We are going to be able to survey only a small portion of it, but I do that at the very urgent request of the University of Maine and the Maine Experiment Station because they tell me very justly that I have done no work in Maine as yet and that there is great need of it. As far as I know, there is no Congressman in the House who had any part in this request coming to me or who has influenced my judgment in any way to go there. I go in spite of Congressional requests in other places. It is necessary, in my judgment, to put one survey up in New York. There is a great demand for this work in New York State. We ought to have two parties at least, in my judgment, in New York. Two parties should be assigned to Pennsylvania; one of them because of the interests of the agricultural college. It is a survey of Center County, Pa., which we began last year, at their request, in order to give them a knowledge of their soils; a request from the college to give them a knowledge of their soils so that they could correlate their results with the soils of other parts of the State.

Mr. HAWLEY. That is in Pennsylvania?

Mr. WHITNEY. That is in Pennsylvania. We do that at their request, and there is no Congressional indorsement to that so far as I am aware. Another party ought to be put into Pennsylvania, because of the very strong requests that have come from the horticultural interests and from the great number of requests we have on file with Congressional indorsements. One survey, in my judgment, should be put in Maryland, and not because of any Congressional indorsement, but because of the fact that we have worked for years in close cooper-

ation with the Johns Hopkins University and the Maryland Geological Survey in studying the formations and soil resources of that State. They have contributed largely to the success of this work and are constantly helping in it. One party should be placed in North Carolina. The State of North Carolina pays half the expense. They determine, Mr. Chairman, where the surveys shall be made, and although I have a great many requests from North Carolina, backed by Congressional and Senatorial indorsements, the matter of the order of the surveys is left entirely to the State Department of Agriculture, which pays half of the expense of the work, so that we have in North Carolina continuously one soil survey party. Parties should be assigned also to California. On account of the enormous size of the State and the importance of the agricultural interests, and owing to the fact also that we have a great many requests there from chambers of commerce, from boards of trade, county supervisors, State officials and State institutions, as well as from individuals, we certainly ought to have two parties in California, and I wish we could have more.

Three parties should be assigned to the State of Alabama, because last year they passed a law appropriating \$10,000 a year for soil survey work for four years, and, according to the plans and agreements that have been entered into, the distribution of the work is to rest with the commissioner of agriculture of Alabama. I am to have no word in that except through consultation with him, and under the terms of the agreement we will be able in five and a half years to complete the soil survey of the entire State of Alabama. This map shows in green the areas that have been surveyed [indicating on map] and in orange the areas that are now being surveyed, and while I say we should have three parties there, it is equivalent to six parties, because with the appropriation made by the State we are maintaining constantly six parties. It happens in Alabama that with six parties we can reach each Congressional district of the State every year. We can survey one county in every Congressional district each year and satisfy all possible interests, so that I look for no trouble in the State of Alabama. But I think we are bound to fulfill the virtual understanding that we have made.

Mr. POLLARD. Do I understand that they appropriate \$10,000 a year, or \$10,000 to cover the whole area?

Mr. WHITNEY. They appropriated \$10,000 a year for four years; and at the rate of progress we will finish the survey of the State of Alabama in five and a half years.

Mr. Chairman, I think we shall have to have two parties in West Virginia. The State of West Virginia has also contributed to this work. They pay all of the field expenses and we pay the salaries of the men. In West Virginia I have no say; I exercise no judgment as to the distribution of the work, leaving that entirely to the director of the geological survey, Doctor White, a very able man, as they are going to follow the work of the geological survey with the soil survey and attempt to republish the maps of the soil survey in their geological survey reports.

In Tennessee I have virtually promised two surveys. They are both with Congressional indorsement, not only with the indorsement of the Congressmen, but of Senators, and this is one of the cases where, on account of our inability to do so much work as was

demanded, and because the demands were so strong, the matter was left to the Senators to decide. Mr. Chairman, that makes sixteen parties that we are virtually pledged to. But I want to tell the committee that it is not going to satisfy a great many Congressmen who have asked for the extension of the work.

Mr. POLLARD. I want to ask you a question for information. I do not want what I say to carry any implication as to what the committee will do or what my own action will be, but I just simply want to ask this for information. I understand from your remarks that in West Virginia the State will pay the expenses of the men in the field; is that correct?

Mr. WHITNEY. Yes.

Mr. POLLARD. And in Alabama the State will furnish half the expenses?

Mr. WHITNEY. Approximately half.

Mr. POLLARD. Are there any other States in like condition?

Mr. WHITNEY. North Dakota.

Mr. POLLARD. Is that all?

Mr. WHITNEY. That is all; those are the only two that are actively contributing, except North Carolina.

Mr. POLLARD. Then if there was no increase made in the appropriation at all for this Department, if you utilized the experts that you have by taking the men from the Washington office who you said could be sent into the field to work continuously, could you not increase the number of surveying parties by taking advantage of this cooperative work in which the States will furnish part of the money? Could you not increase the number of your parties by six or eight?

Mr. WHITNEY. No; under those conditions we are doing all the field work that we can.

Mr. POLLARD. Is there any assistance given by the States in which the seventeen parties you have out now are working?

Mr. WHITNEY. In Alabama.

Mr. POLLARD. That is the only instance?

Mr. WHITNEY. That is the only instance. That is the only State in the Southern States. Now, Georgia is considering the same law, Tennessee is considering the passage of the same law, and Mississippi has the question up, and it is possible that other States will pass the same law. In New York the college of agriculture is trying to arrange to help in the work.

Mr. POLLARD. I do not see why, even if the appropriation was not increased at all, you could not take some of the men from the Washington office and send them into West Virginia. All you would have to pay there would be the salaries, and you are paying them anyway, and if the State board paid the field expenses, that would be two parties there, anyway.

Mr. WHITNEY. We had them there through the whole of the field season. Four of our men were in West Virginia this year.

Mr. POLLARD. They were not supported at all by the State?

Mr. WHITNEY. Their field expenses were paid by the State.

Mr. POLLARD. Just the salaries were paid by the Department?

Mr. WHITNEY. Yes. Of course we can not have them there now, because the weather is not fit.

Mr. HAWLEY. If I understand it correctly, twelve of these survey parties are on the Atlantic and Gulf seaboard, and four—two in

Tennessee and two in California—are assigned to the Ohio, Mississippi, the Rocky Mountain and coast regions?

Mr. WHITNEY. Yes; and in all those cases we get State aid or are working in close cooperation with the State itself.

Mr. POLLARD. At the present time is West Virginia the only State that is furnishing any assistance in the soil survey work that is now being carried on?

Mr. WHITNEY. No; Alabama, North Dakota, and North Carolina are also helping.

Mr. POLLARD. In these seventeen parties that you now have out, there are three States that are furnishing some of the expenses?

Mr. WHITNEY. No; of the parties that we have out now only North Carolina and Alabama are assisting, because we are not working in the Northern States now.

Mr. POLLARD. I meant the parties you had out last year—the current fiscal year.

Mr. WHITNEY. Last year, yes.

Mr. POLLARD. Of course I understand you can not do soil-survey work in North Dakota now; that is apparent.

Mr. WHITNEY. Yes.

Mr. HAWLEY. Does it seem to you to be fair that the great bulk of this appropriation, which is made for the general good of the entire country, should be expended in a few States just because they are appropriating small amounts of money or giving some cooperation, leaving the greater part of the country uncared for in that manner? If the soil survey is a valuable thing, should there not be a distribution of it over the entire country generally, so that people who wished to make homes would know in a general way the general nature of all the soils in the country and could take advantage of that knowledge? It is now being concentrated in a very small area. Alabama, for instance, is to have her work entirely completed before the rest of the States are touched, practically.

Mr. WHITNEY. I am making a plea for more money for the extension of the soil-survey work.

Mr. HAWLEY. Maybe the committee would like to know where it is going to be used. If it is going to be distributed as it is under this distribution, it would be a hard matter, probably, to justify.

Mr. LAMB. The gentleman has just told you that Maine has not had any, and there are others there in the same situation.

Mr. HAWLEY. It is the only State which has not.

Mr. POLLARD. Alabama has now five parties, and he proposes to put in six next year, I understand.

Mr. LAMB. The State is helping.

Mr. POLLARD. Yes, of course the State is helping, somewhat.

Mr. WHITNEY. We do that to meet their condition, which is that we shall put in as much as they do.

Mr. HAWLEY. If that was the general condition made everywhere, would you agree to do that for every State?

Mr. WHITNEY. I think it would be a very wise measure.

Mr. HAWLEY. But your money would not go very far?

Mr. WHITNEY. The money would not go far; and that is why I tell you we are bound up here in a few of these Eastern States that are helping in the work.

Mr. HAWLEY. I can not quite see why you are bound. I think your obligation is to the entire country, and not to any particular State.

Mr. LAMB. My colleague will see that that demand does not come from the great Central West where the people are selling their lands at a very high price and coming down to get these cheap Southern lands.

Mr. HAWLEY. There are 400 demands on file, and 16 are to be satisfied, as I understand it.

Mr. LAMB. If you take that view of it, if he had more money he could do more work.

Mr. HAWLEY. Or the work could be distributed on a different plan.

Mr. WHITNEY. I have applications here on file from the North Atlantic group of States—New Hampshire, New York, Maine, New Jersey, and Pennsylvania, 22 petitions, and the most we can do is 8; from the South Atlantic division—Florida, Maryland, North Carolina, Georgia, South Carolina, Virginia, and West Virginia, 103 petitions, and the most we can do is 14; from the North Central division—Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, and Wisconsin, 85 petitions, and the most we can do is 12; from the South Central division—Alabama, Kentucky, Arkansas, Oklahoma, Louisiana, Mississippi, Tennessee, and Texas, we have 134 petitions, and the most we can do is 17.

Mr. HAWLEY. In what length of time?

Mr. WHITNEY. This is for the entire year. This other memorandum was for the summer months. From the Western division, including California, Washington, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, and Wyoming we have 50 petitions, and we estimate the most we can do is 8. That is a total of 394 areas, and the very most we can hope to do is 59 surveys.

The CHAIRMAN. The question that Mr. Hawley had in his mind, I take it, was why is it that you feel able to give 8 surveys to the North Atlantic States, 3 or 4 small States, and only feel able to give 8 to the western group of 12 States comprising many times as great a territory?

Mr. WHITNEY. Of course it is not as densely populated. We have a far denser population on the eastern border; and then you must remember that we have great problems to solve. There is a depreciation of land values in New York of \$70,000,000. There has been a great depreciation of lands in the New England States, in Maryland and in Virginia. They are picking up, and many of them are getting ahead now. But the problem of the development of these lands is something we are being urged day after day to take up. There is no stronger demand for the work of the Bureau of Soils than that which comes now from the Southern States. Only 12 per cent of the lands of Louisiana are in farms, a country that is now rapidly settling up. They want to know what to do. There is a still smaller proportion of the land in Texas in farms. They want to know what to do; what their soils are adapted to.

Mr. HAWLEY. Is it any more important that they know what to do there than that other sections should know what to do; and are the sections that you are not making soil surveys in to be held charge-

able for the depreciation in New England and in New York. We did not have anything to do with that.

Mr. WHITNEY. There is this peculiar thing about the development of the agriculture of the United States at the present time, that the people from Illinois, Ohio, Indiana, and Iowa are going south. There is a change coming over the distribution of farming population, and the Iowa person to-day is more interested—there are more people to-day in Iowa interested—in the soils of the South apparently than there are in the soil of Iowa itself, and we get more requests to-day from Chicago in regard to the soils of the Southern States than we do about the soils of Illinois. Ten times as many requests are coming from those central States for information in regard to Southern soils, from Virginia around to Texas, than we are getting from the Central States for a knowledge of their own soils.

The CHAIRMAN. You take a county ordinarily as the unit of a survey, do you not?

Mr. WHITNEY. Yes.

The CHAIRMAN. You would not consider that the soil survey of the United States had been completed until every county in it had been surveyed?

Mr. WHITNEY. One-third of the United States will probably never be settled.

The CHAIRMAN. I mean of the agricultural counties?

Mr. WHITNEY. Yes.

The CHAIRMAN. So that even if you had 40 parties, you are not going to complete the survey for a good many years?

Mr. WHITNEY. With 40 parties we ought to be able to survey an area of 60,000 square miles a year.

The CHAIRMAN. Do you know the agricultural area of the United States?

Mr. WHITNEY. Yes. Have you a copy of the report of the Secretary here?

Mr. BONSTEEL. Altogether there are about 800,000,000 acres, as I remember it, in farm lands now.

The CHAIRMAN. That would make about 1,250,000 square miles.

Mr. WHITNEY. That includes all the central valley.

The CHAIRMAN. So at that rate it would be a matter of some twenty years before the work could be completed.

Mr. WHITNEY. I should estimate that with 40 soil-survey parties out, at the end of twenty years we would complete an area equal to all the farm lands in the United States.

The CHAIRMAN. That brings up this question in my mind. There was one statement made by Congressman Underwood this morning to which I think all the members of the committee will agree, and that is that the money spent on soil surveys is practically thrown away unless it is followed up by demonstration work on the part of experts who will show the people just what it means to them. The question in my mind is this: If you should have 40 parties making surveys all the time, would you not get so far ahead of any possible utilization of that work that by the time they got around to utilize it, it would practically be forgotten?

Mr. WHITNEY. Mr. Chairman, I have provided for that in the plans I submitted to the Secretary, and which he has indorsed only in part, by asking for 25 utilization parties.

The CHAIRMAN. Will you tell us what you have those utilization parties do?

Mr. WHITNEY. Yes; in just a moment. In addition to that, I have estimated that we should have 15 soil-management parties; that we should increase our laboratories and our fertility work, and in the estimate that I submitted to the Secretary, which in my judgment was required to meet the demands of the work, I make the appropriation that ought to be made for the Bureau of Soils, \$500,000.

The CHAIRMAN. Now, will you answer my question?

Mr. WHITNEY. Yes. To obtain the fullest information, the greatest benefit, from the soil survey, we have found it necessary to send out what we call utilization parties to show how the soils of any particular area, county, or district should be most profitably utilized. When we made the surveys in eastern Texas and found what we believed to be good tobacco soils, we stated in a publication that they appeared to be soils adapted to the finest grade of filler tobacco. When we made the soil survey of the Connecticut Valley, which was one of the first surveys that the Bureau did, we stated that the quality of the tobacco grown on those soils could, in our judgment, be greatly improved and could approach more nearly the Sumatra tobacco, which has been imported in such great quantities into this country. Very little attention was paid to those observations. Very little attention was given to me when I talked with those farmers about the possibilities of improving their leaf, and I had to come to Washington and tell the Secretary that I firmly believed that on the soils of Connecticut a fine type of tobacco could be grown, approaching the Sumatra, and he let me get some tobacco experts and see for myself first whether that leaf could be improved. The same thing happened in Texas. The recommendation of the Bureau of Soils went without attracting much attention. Those farmers, being used to cotton and corn and the three-crop system that you speak of as applying to Kansas, were not willing to give up their system and their crops to take up a special crop like tobacco. We sent a party of tobacco experts to Texas. We had made a thorough study of the soils, we had compared them with the soils of Cuba, and we were satisfied in our own minds that we could get the quality from these particular soils, and with our experts we got the crop we expected.

The CHAIRMAN. Were those tobacco experts also soil experts?

Mr. WHITNEY. Those tobacco experts were not soil experts.

The CHAIRMAN. Then any other bureau could have done the work just as well, so far as the administration work was concerned?

Mr. WHITNEY. Yes, except for this. Give me just a moment; let me mention just one case here. Any other bureau could have done it except for two reasons. In the first place, it was my judgment that the soils were adapted to tobacco. It was not the Secretary's judgment; it was not Mr. Galloway's judgment; it was not Professor Moore's judgment; it was my judgment. Now, my judgment is not, perhaps, worth much more than anybody else's judgment, but it happened that the Secretary had sufficient confidence in my judgment to authorize me to see if it could be done. There was no one else in the world at the time who would have taken enough interest to have followed that out, to have proved whether my judgment was correct. After I had demonstrated that those particular soils,

and none others, could be used for growing a tobacco that had the aroma, it became a question then of simply handling the crop, developing the industry, and it was turned over to the Bureau of Plant Industry. But it could not have been originated by the Bureau of Plant Industry, it could not have been originated by anybody who did not have an appreciation of the soils and their capacity, because it took us four years to get the products from the soils by our own diligent methods and study of the soil conditions and its relation to crops.

The CHAIRMAN. And yet you say that the men who did that work were not soil experts; they were tobacco experts?

Mr. WHITNEY. Yes; but they were guided in their judgment by soil experts.

The CHAIRMAN. In what way besides the planting of their seed in that particular soil?

Mr. WHITNEY. I told them what soil to use.

The CHAIRMAN. But did you tell them what seed to select?

Mr. WHITNEY. Yes.

The CHAIRMAN. And how far apart to put the plants?

Mr. WHITNEY. Yes.

The CHAIRMAN. And all that sort of thing you instructed them in?

Mr. WHITNEY. We instructed them in all that sort of thing.

The CHAIRMAN. How would these parties that you propose to make up, your 25 utilization parties, be made up; of expert soil men?

Mr. WHITNEY. They would be made up of expert soil men; that is, men who have graduated from the soil survey, men who have conducted soil surveys in Wisconsin, in Tennessee, in New York, in Alabama, in Texas; men who know the soils of this country as no men in the world have ever known the soils of a large area before.

The CHAIRMAN. In some of those tobacco areas in the South, I think in Florida particularly, we were told that experiments made this year in growing tobacco on land that had been indicated as tobacco land by the soil survey produced such an inferior grade of tobacco that it could not be marketed. Was that due to bad cultural methods?

Mr. WHITNEY. I challenge that statement. My tobacco experts tell me that every field of tobacco that was grown in Florida under the supervision and direction of the Bureau of Soils has been a success, and that the product has been sold for a good remunerative price. I would be glad to bring the experts I had, who are now in the Bureau of Plant Industry, to confirm this.

Mr. LEVER. My understanding was that these tobacco areas which had not been successful were not under the supervision of either the Bureau of Plant Industry or the Bureau of Soils, but that they were being handled by individuals. Was not that your understanding?

The CHAIRMAN. My understanding was that the areas upon which the work had first been begun by the Bureau of Soils, some three years ago as I understand it, had been turned over to the Bureau of Plant Industry.

Mr. LAMB. I think you have got that a little confounded. They were talking about the tobacco grown under shade.

Mr. WHITNEY. Just a moment. The facts are that there have been persons who have grown tobacco on soils that they selected in spite of our recommendations that have not been successful; but so far as I have been informed by my experts they have been successful where they have grown it under the direction of the experts.

Mr. CHAIRMAN. Will you be kind enough to cite us to the language in the law under which you carry on this demonstration work? Here is a copy of the bill for last year.

Mr. WHITNEY. Mr. Chairman, the opening sentence of the bill appropriating money for the Bureau of Soils says: "Investigation of the relation of soils as to climate and organic life."

The CHAIRMAN. That is the phrase from which you draw your authority for the demonstration work?

Mr. WHITNEY. From the appropriation bill. Then there is this language: "For the investigation of the texture and composition of soils in the field and laboratory; for the investigation of the cause and prevention of the rise of alkali in the soils of the irrigated districts."

The CHAIRMAN. I had interpreted those clauses as meaning simply investigations of soils. I really had some question in my mind as to whether it would authorize you to go on and raise crops on those soils.

Mr. WHITNEY. It has seemed to me, Mr. Chairman, on the contrary, that this is one of the broadest provisions contained in the agricultural appropriation bill. The first sentence covers practically all of the work of the Bureau: "Investigation of the relation of soils to climate and organic life."

The CHAIRMAN. You think that investigations can not be properly carried on without growing crops?

Mr. WHITNEY. If it is necessary to grow crops.

Mr. LAMB. You do not grow crops yourself?

Mr. WHITNEY. We have grown tobacco as part of our investigations.

Mr. LAMB. In your experimental business?

Mr. WHITNEY. During our experimental business.

Mr. POLLARD. At Arlington?

Mr. WHITNEY. We have grown crops at Arlington, and in Connecticut, and in Alabama, and in Texas.

The CHAIRMAN. I understand that what you now term experimental work involves the growing of crops, does it not?

Mr. WHITNEY. Not necessarily; it did with tobacco.

Mr. LAMB. You grow it through farmers? You furnish the knowledge, and the mechanical work is done by the experiment stations?

Mr. WHITNEY. No, sir; we have had our own experts, so that we could have the crop grown and handled so that we could develop the highest results from the soil.

Mr. LAMB. What did you do—hire the horses and the men?

Mr. WHITNEY. Yes, we have hired the horses and the men, in order to get out the full returns possible by the handling of the soil. We have also in this utilization work made a study of the alkali conditions of the West. We have mapped the alkali soil. We have gone out there and demonstrated the methods by which the soils can be reclaimed. We have had our own men do the work, and after five years we have settled definitely the methods by which alkali soils can be reclaimed. When I first went to California the feeling was so strong that I was warned not to mention alkali; but as a result of our work, having studied the question, having reclaimed typical alkali lands at Salt Lake City, Utah; at Billings, Mont.; at Yakima, Wash.; at Fresno, Cal., and at Tempe, Ariz., four different types of alkali soils, representing all the types of those four different characters of soil, we have been able to show that the alkali soils can be as easily

handled, as economically reclaimed, as the swamp soils of Illinois or Ohio; so that to-day alkali is no longer feared in the West.

The real estate agents have our maps hanging in their offices, both the soil and alkali maps, and they have merely to point out the location of the farm and to tell the prospective purchaser, "You can get this land at \$350 an acre, and you can get this land, which is alkali land, for \$10 an acre, and the Bureau of Soils tells you that this alkali land can be made as productive as the other with an expenditure of \$40 or \$50 per acre." So far from trying to hide their alkali conditions, they welcome the alkali survey. It shows them where they may expect this danger to develop, and shows them where the soils already alkaline can be improved.

Mr. POLLARD. I wanted to inquire whether you had reached the point where the restoration of the alkali soils has passed beyond the experimental stage.

Mr. WHITNEY. Yes; they are reclaiming hundreds of acres.

Mr. POLLARD. And it is an established success?

Mr. WHITNEY. It is an established success, and we are no longer spending money on that except in the way of advice to people who write for it. We have a literature on the subject that is the standard literature, and it is called for from different parts of the world where they have these alkali conditions.

In the development of the utilization work we have been giving attention to the fruit interests of the Appalachian Mountains, an area extending from New York to Alabama, and we have found, as we might have expected, that the question of successful cultivation of orchards is dependent to a large extent upon the character of the soil. With all the development that has gone on in the subject of horticulture, which is one of the most highly developed branches of agriculture, they still lack, and they know they lack, the fundamental knowledge of the relation of the soil to the variety of fruit that they expect to grow. We have been able in the study of our soils, and by our utilization parties, to point out definitely soils adapted to some of the important varieties of fruit, and after I get through with my main presentation, Mr. Bonsteel, who has charge of this work, can give you some very interesting details as to what we have found.

Mr. HAWLEY. I would like to ask you a question on the matter that was under discussion awhile ago. You were speaking of the planting of filler tobacco and wrapper tobacco in Connecticut. What quantity has been produced now in those localities, any considerable quantity?

Mr. WHITNEY. Yes; there are several hundred acres.

Mr. HAWLEY. And do the citizens of that locality, the farmers there, listen to your instructions; and are they doing as you would have them do?

Mr. WHITNEY. Yes; they have warehouses up now for the handling of the products not only in Connecticut but in Texas.

Mr. HAWLEY. And they are complying with your instructions, and raising the quality of tobacco on the land that you would raise if you were doing it yourself?

Mr. WHITNEY. Yes, sir.

Mr. LAMB. How long have you construed this law to give you authority to make the tobacco as well as to investigate the soil?

Mr. WHITNEY. So far as the tobacco is concerned, we have a special clause in the appropriation act, which we think we will no longer use, as the work has been turned over to the Bureau of Plant Industry, to this effect:

To map the tobacco soils of the United States; to investigate the soils and conditions of tobacco grown in Cuba, Sumatra, and other tobacco-competing countries; to investigate, in cooperation with the Bureau of Plant Industry, the methods of curing, with particular reference to fermentation; to investigate, with the view of improving, the conditions relating to the supply and sale of domestic tobacco to any foreign country or countries where the business of buying and selling tobacco is conducted by the Government.

That is as broad an authorization for investigation of conditions of tobacco soils and tobacco products as one could wish.

The CHAIRMAN. If you have had the authority under the preceding bills to carry on this general utilization work, why do you ask for the insertion of this language in this bill, which we have here in italics: "To investigate and demonstrate the best methods for the utilization of the soil resources of the United States?"

Mr. WHITNEY. Mr. Chairman, it has always been the method and the practice of the Department of Agriculture when it was going to take up a certain line of investigation, whether it had authority in its general appropriation or not, to bring the matter to the attention of Congress for intelligent action by inserting in the bill for the current year something that will indicate the new lines of work that are to be taken up.

The CHAIRMAN. Exactly; and I understand from what you say that you have been doing this line of work for two or three years, to which you now call attention?

Mr. WHITNEY. Yes. I do not know that we need that language. I think the first clause in the bill will cover the work of the Bureau of Soils. That language is as broad as you can make it.

The CHAIRMAN. I think I ought to say for my part that I think it is a very strained construction of that clause. But of course and evidently the Secretary must have come to the same conclusion or he would not have inserted this new language, which leaves it without any question if it remains in the bill.

Mr. LAMB. I have never noticed that before.

Mr. WHITNEY. In the utilization work also there is coming to us a strong demand—a strong request—for information as to what can be done with the cut-over pine lands of Michigan, Wisconsin, and Washington. The proposition is put up to us in this way. They have cut over now hundreds of square miles, removing the timber, the only valuable product they had, and the lands in their present form have little or no commercial value. Some of these lands are sandy lands and are not well adapted to agriculture. Some of them are adapted, and it is known that they are adapted, to fruit and special industries. The country, however, has had a bad name given to it by the occurrence of some of the loose sands upon which they have not been able to produce profitable crops, and not over a week ago a gentleman came to see me, a Member of the House, with the president of the Agricultural College of Michigan, asking that we take up the question of the utilization of the cut-over lands of northern Michigan.

Mr. POLLARD. Suppose you do that, how will you go about it? Will you go up there and plant crops after you have made a survey of the soils?

Mr. WHITNEY. Not necessarily; we may be able to determine by the soil survey itself what can be done with those soils. As a matter of fact, we have made some investigations of them and we are fairly well informed as to what can be reasonably expected. In that case, if we are able to determine what can be done we should, after a soil survey has been made, leave a utilization man, someone to get in touch with the people, someone to influence them as to the crop adaptation of their soils and the crop rotations that can be reasonably expected to succeed.

Mr. POLLARD. I would like to ask right there whether that would not be more properly the province of the Bureau of Plant Industry, with reference to the growth of the plants?

Mr. WHITNEY. Until we have demonstrated what the soil is adapted to, it is a soil problem; until we are satisfied as to how those soils should be treated, how they should be cropped, it is a soil study and remains a soil study. You can not go in there without a knowledge of the soils, to improve soils. It is a study of the soils and the soil possibilities. As soon as we have determined the soil possibilities—it may take one year or two years or longer, but as soon as we have determined the way those soils should be utilized—then the question may be turned over to the Bureau of Plant Industry to introduce new crops or new industries, or farm management; but that Bureau can not do this. They are asking us, themselves, to investigate the soils and see what they are adapted to and how they can be managed.

Mr. LAMB. Will not another forest come right up on that land?

Mr. WHITNEY. It is not coming up. They are not replanting them.

Mr. LAMB. They do not reproduce?

Mr. WHITNEY. No, sir; not as they should.

The CHAIRMAN. But I thought what was claimed for your soil survey was that the survey itself would indicate the kind of crops that could be profitably grown there. Do you mean, then, that you would have to experiment for two or three years to find out whether your diagnosis is right?

Mr. WHITNEY. In the case of the cut-over pine lands of Michigan, on some of the soils that we have examined, there are toxic conditions developed in the soil that we have only discovered by our laboratory investigations, and which will have to be removed either by the application of fertilizers, by the rotation of crops, by the more intelligent cultivation of the soil, or by some other method, before those soils are fit to grow crops.

The CHAIRMAN. Then the hundreds of surveys that you have made are of no value unless men equally expert with those who made them go onto the area and test them for toxic conditions or in other ways?

Mr. WHITNEY. Oh, not at all. But here is a condition where they admit at once that they can not grow crops.

The CHAIRMAN. Yes, but I am speaking generally. I thought you were speaking generally.

Mr. WHITNEY. No, I am speaking of that specific case.

The CHAIRMAN. I thought that you were saying in a general way that after the survey had been made you would still need to hold it in your hands two or three years until you can test the soil and find out just what crops will grow there.

Mr. WHITNEY. Not necessarily, at all. I was speaking of this particular case, in reply to a question the gentleman asked me.

The CHAIRMAN. Then what is the occasion generally for your utilization parties?

Mr. WHITNEY. We will go back to the case of the fruit lands of the Appalachian Mountains. The horticulturists of the Bureau of Plant Industry are just as much in the dark as to the soil adaptation of varieties as the horticulturists are of the States themselves, and we are getting the most urgent requests that we receive for the utilization work in the development of fruit interests from the people of the Bureau of Plant Industry, who want us to precede them in the study of the adaptation of soils, so that they can work out their horticultural problems. Not only on the Atlantic coast but on the Pacific coast, the problem of shipping fruits is dependent in some areas on the soils that they are growing on. The question of distribution of their wine and raisin grapes is a soil problem. The horticulturists of the Bureau of Plant Industry are seeking our help all the time to solve that problem of soil utilization.

The CHAIRMAN. Are they seeking your help in any way except from the soil survey?

Mr. WHITNEY. Yes; soil study.

The CHAIRMAN. Then I misunderstood you. I thought you told us a while ago that your soil survey was sufficient in the Appalachian region here to indicate the types of soils on which different types of crops and fruits would grow, and from that I should assume that having made the survey you could then say, "You can grow wine-saps here, and you can go ahead," and from that time on the problem would be solved. Was I wrong in that understanding?

Mr. WHITNEY. No, you were right; and I went further in showing you why we sometimes had to hold on to a problem longer when problems come up like the cut-over pine lands, or the question of the quality of the fruit in California, where the fruit rots—turns dark—even in cold storage. That is the result of a soil property, a soil influence, and we have to keep a problem like that until we understand the soil, and then we can turn the work over to the other bureau. But while they are doing their horticultural work there, we are working on the soil side in cooperation with them.

We have another case, that of the potato culture. On the Stockton area of California they have 200 square miles of muck soils that they have recently reclaimed, and potatoes are the things to grow. The soils are admirably adapted to potatoes. They get 400 bushels in their first crop, the second crop they get less, and the third crop they get nothing at all; they get no merchantable potatoes, or the yield is so small as to be negligible. Mr. Chairman, that is a soil problem. It is not a question of sending seed potatoes out there; it is a question of finding out why potatoes will not grow. Those are questions that we solve, and they are questions that we solve for the Bureau of Plant Industry as well as for individuals and communities. We show them also where they can grow new crops.

Mr. POLLARD. Take the concrete case of the potato, and follow it through. You first go and make a survey of the soil and find out what is disclosed by your survey, and then you make a report as to your findings, and in that report you indicate what kind of potatoes will grow there, and you also recommend cultural methods, do you?

Mr. WHITNEY. So far as the soil is concerned, so far as management methods and cultivation of the soil are concerned.

Mr. POLLARD. Where does your utilization come in—your demonstration? You go there with your expert and he hires some men and you undertake to plant potatoes to demonstrate the accuracy of your survey?

Mr. WHITNEY. No.

Mr. POLLARD. Do you go there and cooperate with a farmer and have him raise potatoes under your direction? What is the method you pursue there?

Mr. WHITNEY. In the case of the potato-sick soil I have referred to, in California, we are actually getting out from the soil the substances that are prejudicial to the growth of potatoes, and we are studying those and are finding out how to correct the conditions. Now, further than that, we are arranging with the owners of the land to carry out some simple experiments at their own cost, which we believe will correct the trouble. That is tentatively being arranged now. After we have finished our investigations we will be able to tell him exactly what he must do to maintain his yield of potatoes and to continue to cultivate that land.

Mr. POLLARD. Will you explain to the committee wherein your work in that connection is not a duplication of the work that the Bureau of Plant Industry does?

Mr. WHITNEY. The Bureau of Plant Industry does not know anything about the soils.

Mr. POLLARD. Of course; but they take up the cultural methods in regard to the potato and other plants.

Mr. WHITNEY. Yes; in general.

The CHAIRMAN. You are dealing with the cultural methods and not soil survey, in that case?

Mr. WHITNEY. We are dealing with cultural methods, only so far as it is necessary to grow the crop and maintain the fertility of the soil.

The CHAIRMAN. You are going into cultural methods?

Mr. WHITNEY. Yes; we go and raise a crop sometimes in order to see whether cultural methods have created certain conditions in the soil. We have to use the crop as an indicator of the efficiency of our soil treatment.

The CHAIRMAN. Is not the question of studying the cultural methods the province of the Bureau of Plant Industry rather than that of the Bureau of Soils?

Mr. WHITNEY. Not the question of studying the cultural methods that have to do with the improvement of the soil, because it is only through our soil studies that we can arrive at the means to correct soil conditions.

The CHAIRMAN. Are your experts horticulturists and experts in cereals and other lines, so that they understand the history and habits of plants?

Mr. WHITNEY. No; we do not go into that.

The CHAIRMAN. I presumed you did, from your statement.

Mr. WHITNEY. No; we do not infringe at all upon the work of the Bureau of Plant Industry.

The CHAIRMAN. You think there is no duplication?

Mr. WHITNEY. No; we do the work at their request, just as often as we do it for ourselves. We have men working with their parties, and we have requests from them for soil surveys, and we have requests from them to study the soils. We have a situation now, a very interesting case, in the Department itself—rose soil from Arlington in which roses will not grow. They die. The matter was referred to us. They can not handle that. They know far more about roses than we do, but we know far more about soils than they do. Now, to study the cause of the infertility of those soils. We have been able to obtain from the soil a substance which we think is the poisonous thing. They at our request have started a lot of rose cuttings, rooting them in sand, for experimenting with this substance that we have found in the soil. It does not take very long to determine whether that is the thing that kills the roses or not.

The CHAIRMAN. But I understand that in this case the Bureau of Plant Industry is doing that. After you made your soil survey and discovered what you thought was the cause of the trouble, and indicated to the Bureau of Plant Industry how they could correct it, you turned it over to them and they are making the experiment?

Mr. WHITNEY. No; we are making the experiment until we are sure that we have reached the source of the trouble, and then they will take it and apply our results to their greenhouses.

Mr. LEVER. All the cultural work you do is incident to the soil work?

Mr. WHITNEY. Is a mere incident to the soil work.

Mr. LEVER. And it is in no sense a duplication of the other work of the Department?

Mr. WHITNEY. Not in the least.

Mr. POLLARD. I understood you to say that you wanted an appropriation sufficient to put into the field 25 utilization parties?

Mr. WHITNEY. Yes.

Mr. POLLARD. I understand that those are parties that are to carry on just this kind of work, are they?

Mr. WHITNEY. Yes. I would like to correct a statement made by Mr. Underwood this morning. I did not feel that it was proper for me to do it at the time, but I would like to correct it now. He said that we had a horticulturist in his district. We have never had a horticulturist in the Bureau of Soils. We have a man who knows more about fruit soils than anyone has ever known before, and he was able to go down there and show them the soils upon which they could reasonably expect to obtain the different varieties of apples, and he merely mentioned incidentally that even if they established an apple orchard they would have to get a horticulturist from the Bureau of Plant Industry to show them how to prune it and spray it and take care of it. The first thing is to know the adaptation of these varieties of apples to his district, and that we are working out; but we are not planting orchards.

Mr. POLLARD. Coming back to these utilization parties, as I understand it, you have a soil party of two men that goes and makes a survey of the soil, and they indicate what kind of crops can grow there, and they also indicate, in a limited way, the cultural methods that

ought to be applied, and then one of these utilization parties follows up the soil-survey party and demonstrates whether your theory is correct; is that the idea?

Mr. WHITNEY. Only where that is necessary. In the case of this area Mr. Underwood spoke of, the county was surveyed and then there was a desire to reestablish the fruit industry, and we sent this man that we have trained in fruit soils down there.

Mr. POLLARD. When you make a survey of fruit soils, as you did there, when you get your survey of the soils, rather, you compare that with other soils where fruit is grown?

Mr. WHITNEY. Yes.

Mr. POLLARD. For instance, with Pennsylvania soil or New York soil or soil taken from the New England States where soil of a similar character would grow fruit?

Mr. WHITNEY. Yes.

Mr. POLLARD. Why was it not all that was sufficient in that case to let a plant man, a horticulturist, go down there and apply the methods of New England or New York, or anywhere else where they have a like soil?

Mr. WHITNEY. You can not grow the same crop on the same soil in New York as in Alabama.

Mr. POLLARD. That is true, of course, but that is not a soil problem, it is a climatic problem.

Mr. WHITNEY. Yes, it is a soil problem. What the soil will produce in Alabama is a very different thing from what the soil will produce in New York. The possibilities of the soil in Alabama is what they want. They do not want to know what the possibilities of this soil are in New York.

(At 4 o'clock p. m. the committee adjourned until to-morrow, Tuesday, January 28, 1908, at 10 o'clock, a. m.)

COMMITTEE ON AGRICULTURE,
HOUSE OF REPRESENTATIVES,
Tuesday, January 28, 1908.

The committee met at 10 o'clock, a. m. Hon. Charles F. Scott (chairman) in the chair.

THE CHAIRMAN: The Committee will resume consideration of the estimates for the Bureau of Soils, and I will ask Mr. Whitney to continue his statement.

Mr. WHITNEY. Mr. Chairman, just before we left off in the hearing yesterday afternoon I had spoken of the estimate of the Bureau in order to comply with the requests on file, and with the demands of the work, for an appropriation next year of \$500,000, and I wish to submit, to go in as a part of my statement, a statement which I have here showing in the first column the appropriation for the fiscal year 1908, the estimates recommended by the Secretary of Agriculture for 1909, and the estimates of the Bureau as to what should be done in order to comply with the requests on file, and the demands that are being made upon the Bureau, and I would ask, if there is no objection, to have this go into the record. This about doubles the appropriation of the Bureau, and I told you yesterday that there are sufficient trained men in the country now who are available

and the demands on the Bureau fully justify such an increase at this time.

The CHAIRMAN. Very well.

The statement referred to is as follows:

Lump fund appropriation, Bureau of Soils.

| | Fiscal year
1908 approp-
riation. | Estimates
recom-
mended for
fiscal year
1909. | Bureau esti-
mates for
fiscal year
1909. |
|-----------------------|---|---|---|
| Administration..... | \$48,290.00 | \$45,100.00 | \$75,000.00 |
| Laboratories..... | 19,850.00 | 23,750.00 | 35,800.00 |
| Fertility..... | 17,200.00 | 20,403.33 | 29,200.00 |
| Soil survey..... | 79,520.00 | 91,920.00 | 200,000.00 |
| Soil management..... | 37,020.00 | 16,978.67 | 50,000.00 |
| Soil utilization..... | | 37,450.00 | 80,000.00 |
| Erosion..... | 5,000.00 | 5,000.00 | 30,000.00 |
| Total..... | 206,980.00 | 240,680.00 | 500,000.00 |

* This includes an item of \$4,000 for rent which is not included in the estimates for 1909.

| | | |
|----------------------------------|--------|---------|
| Soil survey, 40 parties..... | each.. | \$5,000 |
| Utilization, 25 parties..... | each.. | 3,200 |
| Soil management, 15 parties..... | each.. | 3,000 |

Soil survey requests.

| | On file. | Areas
proposed
for 1909. | | On file. | Areas
proposed
for 1909. |
|--------------------------|----------|--------------------------------|-------------------------|----------|--------------------------------|
| North Atlantic division: | | | South Central division: | | |
| New Hampshire..... | 2 | 1 | Alabama..... | 27 | 6 |
| New York..... | 11 | 3 | Kentucky..... | 2 | 1 |
| Maine..... | 2 | 1 | Arkansas..... | 18 | 1 |
| New Jersey..... | 1 | 1 | Oklahoma..... | 6 | 1 |
| Pennsylvania..... | 6 | 3 | Louisiana..... | 5 | 2 |
| | 22 | 8 | Mississippi..... | 9 | 2 |
| South Atlantic division: | | | Tennessee..... | 21 | 2 |
| Florida..... | 13 | 2 | Texas..... | 46 | 3 |
| Maryland..... | 3 | 2 | | 134 | 17 |
| North Carolina..... | 15 | 2 | Western division: | | |
| Georgia..... | 19 | 2 | California..... | 25 | 3 |
| South Carolina..... | 19 | 2 | Washington..... | 3 | 1 |
| Virginia..... | 24 | 2 | Colorado..... | 4 | 1 |
| West Virginia..... | 10 | 2 | Idaho..... | 4 | 1 |
| | 103 | 14 | Montana..... | 4 | 1 |
| North Central division: | | | Nevada..... | 1 | 1 |
| Indiana..... | 12 | 1 | New Mexico..... | 1 | 1 |
| Illinois..... | 5 | 1 | Oregon..... | 4 | 1 |
| Iowa..... | 6 | 1 | Utah..... | 3 | 1 |
| Kansas..... | 4 | 2 | Wyoming..... | 1 | 1 |
| Michigan..... | 11 | 1 | | 50 | 8 |
| Minnesota..... | 4 | 1 | Total..... | 394 | 59 |
| Missouri..... | 12 | 1 | | | |
| Nebraska..... | 15 | 1 | | | |
| North Dakota..... | 4 | 2 | | | |
| Ohio..... | 3 | 1 | | | |
| Wisconsin..... | 9 | 1 | | | |
| | 85 | 12 | | | |

Soil utilization problems and projects.

2. The possibility of extending crops now grown to other areas possessing the same characteristic soils and similar climatic conditions.

a. Adaptation of the soils of the Houston series to alfalfa in Texas, Mississippi, and Alabama.

b. Adaptation of the soils of the Miami and Dunkirk series to alfalfa in New York and Pennsylvania.

c. Adaptation of the Dunkirk series of soils to grape production in Ohio, Pennsylvania, and New York.

d. Adaptation of types of soil to varieties of fruit in the Appalachian fruit belt from the Hudson River to Northern Alabama.

e. Adaptation of soils of the Norfolk and Portsmouth series to the production of truck crops in Maryland and Delaware.

f. Study of the extent of soils adapted to rice culture in Louisiana, Texas, Arkansas, and Mississippi.

g. Reconnaissance of the viticultural soils of the central valley of California.

h. Adaptation of soils to apple production in the interior and coast valleys of California, Oregon, and Washington.

i. Methods of control of alkali in seepage and overflow lands of the irrigated States.

j. Utilization of so-called "worn out" soils of New York, Pennsylvania, and Ohio.

k. Adaptation of soils to market gardening, trucking, and small fruit production in the New England States.

l. Adaptation of the soils of middle Tennessee to varieties of peaches.

3. The study of the adaptation of varieties of the staple and special crops to different types of soil:

a. Adaptation of varieties of cotton to extensive soil types in the South Atlantic and Gulf States.

b. Adaptation of varieties of corn to types of soil in the North Central and North-eastern States.

c. Adaptation of varieties of apples to extensive types of soil in the eastern fruit-growing districts, especially in New England, New York, and the Appalachian fruit belt.

d. Adaptation of the different varieties and grades of tobacco to soils.

e. Adaptation of the varieties of the principal truck crops to soils on the Atlantic seaboard.

f. Same for the Gulf States.

g. Same for the Great Lakes States.

h. Adaptation of the different varieties of wheat to dominant soil types in the prairie States west of the Mississippi.

Mr. LEVER. You ask for a total appropriation of \$500,000 for the Bureau?

Mr. WHITNEY. That is the Bureau's estimate, not the Secretary's estimate. But I will say that this is referred to with the knowledge of the Secretary.

Mr. WEEKS. Why did the Secretary reduce your estimate?

Mr. WHITNEY. Well, I think the Secretary wanted to leave the matter to the committee. He asked for an increase of about 20 per cent in the appropriation, which was as much as he thought under the circumstances it would be wise for him to ask for, and he told me that he would be perfectly willing to have the amount increased if the committee were favorable to it. In discussion yesterday it seemed to me rather clear that the committee or some members of the committee seemed to think that when the soil survey of an area was completed, that was all there was to the soil investigation; but I wanted to show, and will with your permission show, that in the soil utilization work we are carrying on there is a great deal more to the work than the actual survey. But I want to digress at this point a little to show that there is still other work that the Bureau of Soils is undertaking in the investigation of the fertility of the soil and the cause for the poor yields of crops. The investigations of the Bureau of Soils as to the causes of the deterioration of soils, and the causes that limit crop production, have changed the view point of the entire world.

The recent investigations of the Bureau in soil fertility have changed the thought of the world, and several foreign governments, notably the Governments of France, of Japan, of South Africa, and of Australia, have taken up these new ideas of soil fertility, and are pushing the investigations along the lines of the United States Department of Agriculture, and are finding that they are able to explain causes of infertility that they have never been able to explain previously. To give the committee an idea of the character of this work and of the fact that the work of the Bureau does not and can not stop with the soil survey, I should be very glad to have you hear Mr. Schreiner, who has charge of the soil fertility investigations of the bureau, as to some of the questions that we are called upon to solve, and then we will go back again to the utilization work.

The CHAIRMAN. Without wishing to seem to impose any limitation at all upon the various gentlemen whom you would like to present, may I request that they make their statements as brief as is consistent with bringing out the points that they wish to make. Our hearings are being protracted beyond the period we expected, and we would like to limit them as much as we reasonably can and still bring out all the information the committee desire, and to bring out all the points of the work you desire.

Mr. WHITNEY. I should only say I would be very glad to do it. I should have been very glad to have presented my matter yesterday in a shorter time.

The CHAIRMAN. We understand that your time is occupied by the members of the committee asking questions. I merely make that suggestion now.

STATEMENT OF MR. OSWALD SCHREINER.

Mr. SCHREINER. Mr. Chairman, the soil surveys of the Bureau, covering as they do portions of all parts of the United States, bring to our attention a great many problems with which either the farmers individually or large aggregations of farmers have to deal. This has led us to a fundamental study of the soils, in order that we may better understand soils and soil conditions, in order to understand the production of the crops, both as to quality and quantity. In studying questions of this kind it becomes of course necessary to decide upon a method of procedure. The old customary procedure has been practically to analyze soils for certain mineral constituents supposed to be valuable to plants, and which are valuable to plants. On studying the soils, however, one will find that the mineral matter is common to all soils; all of them contain mineral matter of one kind or another. I will not, therefore, dwell on the characteristics which are common to soils.

The other material is the organic matter of the soil, and the soil is not good soil until it has at least some organic matter in it. I will say, therefore, that the investigations would seem to have been necessarily directed toward the organic matter, because even a preliminary study has revealed to agriculturists the value of this organic matter. However, the great questions of infertility were the ones which were naturally most prominent, and it is the troubles that soils give that I wish to speak of, and which I was particularly investigating with the aid of all the resources of the Bureau. To investigate that properly

we studied the organic matter, and then only that organic matter which was different in different soils, not the type of organic matter that is common to all soils. That belongs to another division of the Bureau, and you may care to hear of that later. I studied specifically, then, with the force at my disposal, the materials which differ in different soils. In some soils the organic matter, as you know, is black, where an equal amount in another soil is lighter colored. In one soil it increases and in another soil it disappears. These tell us, of course, that there are different processes at work in different soils, that the organic matter is undergoing different changes, with the production of different chemical compounds as it decomposes, as it changes, as life grows upon it. As the plants grow upon it their débris, their excreta, is left in the soil, molds develop in the soil, and other micro-organisms tend to take away the constituents of the soil and leave other constituents in it.

We have actually succeeded in isolating from soils bodies which, when presented to the plants, to their roots, are toxic to them. In this way, to illustrate, we have taken a cotton soil from Tennessee and we have been studying it and we have isolated from it a very white crystalline body which is toxic to plants. It has been introduced there by the growth of the previous vegetation, and by deposit of materials in the soil. So also in a wheat soil, when wheat grows continuously on the same soil, the excreta of the wheat, if the condition of the soil is such that it does not take care of them, does not oxidize them, does not destroy them, or if we have not aided the soil by cultivation, aeration, etc., in destroying them, will accumulate there. When we take such a soil in which the wheat excreta have accumulated, we have been able to obtain a white crystalline body, different from the first one I spoke of entirely, which in turn is decidedly toxic to wheat; that is, it is poisonous to wheat. In other words, there is in the soil something about which the plant men have not known a thing, or which they have entirely ignored, which good agriculturists have in the past ignored, except in the very early stages of the science, when it was a mere hypothesis; they have wholly ignored it among the enemies of plants in the soil which accumulate there and which hinder their development. In other words, there is something in the soil that is far deeper than mere lack of substances that are beneficial, lack of mineral substances, the so-called plant food; but there is something present that hinders plant growth, hinders its development, even in the presence of the mineral constituents of plant food.

To give you another illustration, take a "cowpea-sick soil." That is one of the great problems, the "sick" soils, as we call them, in agriculture. We have clover-sick soil and cowpea-sick soil, and we have soils on which the yield of wheat is very low. We have the flax-sick soil, and the potato-sick soil where, when potatoes are grown a few years, the soils are practically, as they say, "exhausted." These sick soils are the ones that are the most fruitful to study at the present stage, but we are also studying the low yields that always follow continuous culture with the same crop. Now, taking the cowpea-sick soil, one in which the cowpea has grown luxuriantly and then less and less and less until the cowpea no longer grows. If we take a soil like that, we have been able to get from it by a comparatively simple method a very pretty crystalline body, with long

white needles under the microscope, needles or bristles of an organic body.

When we undertook to introduce this to the cowpea, we found that it poisoned the cowpea. The cowpea did not grow. That has been put into the soil from this continuous culture, and it affects the cowpea in that way; when this pure material is presented to the cowpea, the cowpea refuses to grow; its roots are stunted, they hardly develop at all; the tops are not unfolding, even in the seedling plant. But now—and this is the interesting part in connection with such a cowpea soil—if we grow another crop upon that soil, like wheat, the wheat will grow not only as well, but more luxuriantly than it did before the cowpea grew there, and upon studying this particular body which was isolated from the soil, and presenting it to wheat, the wheat is benefited thereby. So we have here a body which is toxic, which is poisonous, to the cowpea, because it is the product of the cowpea, but which is not poisonous to wheat, because it is not a product of the wheat. It is even beneficial to the wheat. This has a great value in rotation, as you can readily see, and our investigations have further shown that the excreta from the wheat are toxic to the wheat, that the excreta from the cowpea are not toxic to the wheat, that the excreta from the corn are not toxic to wheat, and so on; but when we come to a closely related plant like oats, then we find again the excreta from the oats is toxic to the wheat. That is all in harmony with agricultural experience. We have demonstrated here that it is the excreta, and these excreta are definite chemical bodies. We have isolated in that way a number of bodies from different soils. We have another one from a flax-sick soil.

MR. POLLARD. That is a very interesting subject to me. I wanted to ask what actually takes place. You say that the excreta from the wheat is not poisonous to the corn. Now, the rotation of the crop eliminates this poisonous matter that is excreted. What takes place there? Does the lapse of time destroy it?

MR. SCHREINER. I was coming to that, but I can say right now that these questions will help me to bring out more clearly to the committee what I would have developed in the course of the talk. As to the elimination by crop rotation, a number of factors enter. I submit at first that in a soil naturally well adapted to a certain crop there are conditions which eliminate that thing from year to year, so that the next year the crop grows again, splendid as it did the year before. If that condition does not exist, and this material accumulates, then it will slowly, a little at a time, accumulate as the years go by, and finally in five or six years the crop runs down very materially.

Now, if you rotate, we have this state of affairs. First of all, longer time. If we give it two years, more of the excreta from the cowpea will have been changed; due to cultivation, due to better aeration, due to the life in the soil itself, it will have been changed, and in the second year there would not be as much, and in the third and in the fourth there will be still less, of course, so that by rotation or by longer time alone the condition may be restored. But another element enters, and that is also a remarkable property, and one that I feel sure is new to most of you here, as it is, indeed, to many of the plant men, and that is that the roots of plants possess a tremendous

oxidizing power. It is mild, but it is effective; it is continuous. If I take a body which is colorless when in an unoxidized condition, and which is colored when oxidized, and put the plant roots into this colorless body, you can see the body which is unoxidized gradually change and become colored; you can see it change from a colorless to a colored compound. You can see that with the eye. Now, the same process takes place, whether the body is colored or not. When we introduce plant roots into soil containing material of that kind, the plants themselves are oxidizing the material which was derived from another source. The wheat plant has not the power to oxidize its own excreta, but it has the power to change the excreta from other plants, so that in that way each plant can aid the other in destroying bodies from other plants.

Mr. HAWLEY. What becomes of this substance?

Mr. SCHREINER. It is changed into something else. For instance, the excreta from the cowpea is changed by the wheat into another compound.

Mr. HAWLEY. Does that finally become a compound that is useful to plants?

Mr. SCHREINER. It may become a compound that is useful or harmless. Of course the soil is filled with a number of compounds that are harmless, a number that are beneficial, and a number of those that are harmful. I am speaking of the organic matter pure and simple, now, and of course they will not always be bodies that will change things over to those that are beneficial.

Mr. COLE. If you did not care to change the crop but wanted to continue to grow the same crop by the use of fertilizer, would the effect of that fertilizer be to neutralize the effect of the excreta?

Mr. SCHREINER. We have gotten some actual evidence where these bodies are destroyed by the fertilizer. I spoke a moment ago of the oxidizing power of the plant. That oxidizing power of the plant is greatly stimulated by nitrates, a question entirely apart from the nitrate for the formation of proteid material in the plant. When the nitrates are put there the oxidizing power of this plant is greatly increased, so that the combined effect of these nitrates and the plant is very great in neutralizing and destroying these bodies, actually destroying them so that they can no longer be found by the most delicate tests. Lime is very effective indeed in conjunction with plants in very many of these toxic effects. When we study the effect of nitrates on some soils, there is an effect you see entirely separate from the effect of nitrates on plants. If you study the effect of these fertilizer constituents on the soil itself, it is a soil study. What do the fertilizers do to the soil? How do they alter a soil or the life within the soil? So the fertilizer question becomes one of how the soil is affected by the fertilizers, making it a fit home for the growth of crops. It is along those lines that we are continuing our researches. We have already reached very striking results along them, so that we can already control and advise the farmer in a practical way on many of these questions. We understand now how the fertilizers act. At present the fertilizer practice is to a large extent upon an empirical basis. It is one of trial, I mean. We must try the fertilizers on this soil and on that soil.

Mr. POLLARD. Can you not tell by your analysis of the soil what fertilizer is required?

Mr. SCHREINER. Not by any mineral analysis, you can not; no sir. I think that I will be supported in that by agriculturists the world over, in the present state of the progress we have made and which has been presented to them.

Mr. POLLARD. The only way you can tell what fertilizer to use is by trying?

Mr. SCHREINER. The experimental method in plots or otherwise is practically the only safe guide in the use of fertilizer at the present time, until this work came in and is developed. Analysis has been made for over a half a century. It has been made by almost all kinds of methods. I think I can use no more striking illustration than the fact that over fifty different solvents have been recommended for analysis, each investigator condemning the others. This will show that there is no harmony whatever in regard to chemical analysis. The problem is a far deeper one than that of determining how much of the mineral elements are present in the soil. As I have shown you, these bodies are present in the soil, and there are many of them. These bodies are present and modern agriculture must deal with them.

Mr. POLLARD. Will the chemical analysis of the soil disclose the excreta that are there that have been given off by the plant?

Mr. SCHREINER. Not the chemical analysis as ordinarily practiced. The work which we are carrying on does.

Mr. POLLARD. By analysis can you determine that?

Mr. SCHREINER. Not by analysis, but by an actual separation of the bodies and study of them.

Mr. POLLARD. And you can separate them?

Mr. SCHREINER. In that way an analysis, but not the conventional analysis of the soil. That is an entirely different kind of analysis, technically, from the ordinary analysis.

Mr. POLLARD. It is a physical analysis rather than a chemical analysis?

Mr. SCHREINER. It is a physical separation, although chemical means are involved in getting it out and studying it.

Mr. GILHAMS. If you have the physical analysis of the soil, can you state what the action of a certain fertilizer will be upon that soil?

Mr. SCHREINER. If I have it?

Mr. GILHAMS. If you have the physical analysis of a piece or body of soil, can you tell what the action of certain fertilizers is going to be on the soil?

Mr. SCHREINER. You mean by physical analysis, if I have separated one of those bodies?

Mr. GILHAMS. Yes.

Mr. SCHREINER. We are studying that and can now to a large extent give advice on the question.

Mr. GILHAMS. Can you not by this analysis state what plants will grow successfully in that soil?

Mr. SCHREINER. We can to a certain extent, even now, do that. But there is still greater experience to be gained, of course, before all of this can be put on quite so simple a basis.

The CHAIRMAN. Would you feel warranted in the present stage of your investigations in taking an analysis, by whatever method you deemed best, of the soil on a wheat field, for example, and telling a man what kind of fertilizer, and how much of it, he should put on that field in order to bring about a maximum yield?

Mr. SCHREINER. Not by analysis alone. It requires an investigation of a great many factors. I would not like to give this committee that impression. This is only one of the large factors which enter into crop growth.

The CHAIRMAN. Would you feel warranted in giving such advice after considering all the various factors?

Mr. SCHREINER. Certainly; certainly I would feel warranted in giving such advice.

The CHAIRMAN. Would that advice be based upon your scientific investigations or upon the demonstrations and experimentations?

Mr. SCHREINER. It would be upon general knowledge which is gained, which we know of such conditions. Part of that, of course, you must understand, is always experience based upon a full knowledge of the soil, and indeed as far as giving just a sample of soil to me to analyze and then advise you, that would require also, in addition, a great deal of field work, of field experience, with those soils.

The CHAIRMAN. You would not be willing to say, then, that you are warranted now in taking a sample of soil and prescribing the fertilizers that should be used to bring about the best results from it?

Mr. SCHREINER. We can do a great deal in that direction already; a great deal.

The CHAIRMAN. I am asking you a specific question and I would like to have a categorical answer. Do you or do you not feel warranted at the present stage of your investigations in taking a sample of soil and prescribing the fertilizers that would bring the best results?

Mr. SCHREINER. No; not absolutely.

The CHAIRMAN. That is what I wanted.

Mr. SCHREINER. The investigations must be continued for that effect.

The CHAIRMAN. In other words, you have not brought the matter to an exact science? You have not brought the matter to the stage where you feel justified in publishing?

Mr. SCHREINER. Many of these things I am speaking about have been published for the guide of other investigations.

The CHAIRMAN. But they are scientific rather than immediately practical?

Mr. SCHREINER. No; many of them are immediately practical. You see that this discloses now and gives a reason, which has never been given before, for crop rotations. It also gives a reason for the action of fertilizers, especially their erratic action, and the action of some fertilizers which have not been understood at all, which have supplied no plant food, such as lime and fertilizers of that nature. This has put us on a basis where we know what things do in the soil, and therefore we can more intelligently recommend this or that fertilizer than we ever could before, on the basis of any mineral analysis.

Mr. GILHAMS. If I was farming and I wanted to grow a certain crop on a certain field, and I were to send you the soil that is in that field and ask you your analysis of the soil and tell you what I wanted to grow on that field, would you tell me what to place in the soil in order to make the best crop?

Mr. SCHREINER. Not from that analysis alone; no.

Mr. COOK. Would it be possible for you to make a separation of the soil by centrifugal force, and after making a separation, to make your determinations as to how much fertilizer could be used with advantage in the soil?

Mr. SCHREINER. No; that can not be done. You can not tell from any analysis of that kind how much fertilizer to use.

Mr. COOK. We were told of a separation by Doctor Galloway, last week, by centrifugal force.

Mr. SCHREINER. That is a separation of the moisture from the soil; but you can not tell from that what fertilizers to use. You can get at, in that way, the composition of the soil moisture. We have also done a great deal of work along that line in our early work, a great deal.

Mr. COOK. Would not the specific gravity of the soil by a centrifugal separation determine whether or not those soils were available?

Mr. SCHREINER. Whether those soils were available?

Mr. COOK. Yes.

Mr. SCHREINER. That is easily shown, that those soils are available. The great difficulty is that when they are available they still have present these bodies which injure plant growth. To illustrate, if I make such an extract as you speak of, by centrifugal force or by filtering, and I grow plants in one of these solutions from unproductive soils, you will find that in such an extract from the soil the plants would not grow as well as they do in distilled water, which contains no mineral matter whatever. There is something in that soil solution that is harming the plants, and until we deal with that and recognize that we can not grow plants in it. The Bureau has been the one that has brought this forward and investigated these things as no one else ever attempted to do it before.

Mr. GILHAMS. Is there any part of the Bureau of Plant Industry or of the Bureau of Soils that can tell what elements are essential in the building up of a plant? Suppose I wanted to grow corn, does either the Bureau of Plant Industry or the Bureau of Soils enable me to know what the elements are in the making of the cornstalk, and the ear of corn, and the elements I must have in the ground?

Mr. SCHREINER. Yes. The point is simply this, that in the growing of the corn it needs the elements of food. It gets them from the mineral material in the soil. But if it does not grow well in spite of the fact that the mineral material is there, it means that your soil is in some way hindering the growth of the plant. That is the great point I am trying to bring out here. The plant is being affected very badly from remains of plants, or previous plant growth.

Mr. GILHAMS. Then, if you know what is necessary to build up a good crop, and I should send you the soil, is not the Soil Bureau able to tell the poisonous element that is in the soil, and something that is necessary to transform the poisonous element.

Mr. SCHREINER. Yes, after investigation.

Mr. GILHAMS. If I were to send you the soil, could you do that?

Mr. SCHREINER. I could make an investigation.

Mr. GILHAMS. And could you tell me what was wrong with the soil for the growing of corn?

Mr. SCHREINER. I could tell you whether there was something present in the soil that was injuring the growth, or that there was something perhaps that you ought to add to make the plant grow.

Mr. GILHAMS. That is what I wanted to know.

Mr. HEFLIN. Could you tell what it was?

Mr. SCHREINER. I could tell what the body was and also probably what it was you should add, at the present time.

Mr. GILHAMS. If I should say in sending my soil to you that I wanted to grow alfalfa on this field, then you would have certain knowledge of the particles that make up alfalfa, or the chemical elements?

Mr. SCHREINER. Yes.

Mr. GILHAMS. And then you would be able to tell me by the analysis of the soil what was poisonous in the soil, and what the soil lacked to build alfalfa, and what elements I should have to put into the soil to bring it to the proper condition?

Mr. SCHREINER. Either what elements, or what methods you should use, or what crop rotations. I would say in reference to alfalfa that that is not a practical illustration; but what elements to use.

Mr. GILHAMS. Then, you would be able to tell us?

Mr. SCHREINER. We would turn those things over to the utilization division of the Bureau. They would utilize all this information which the laboratories can give, on top of all of the experience gained from the field survey of your region, the knowledge of your soil in that region, the knowledge of your crops and your climate, all of which enter in, besides this factor; they would take this factor and the others and give you the advice, yes. That is what the soil utilization work of the Bureau is for. That is the idea of it, entirely.

Mr. GILHAMS. Then you could take one of these men, what you call the soil-utilization man, who goes out into the field, into your laboratory, and after you had made a chemical analysis of the soil, knowing the plants that I wanted to grow, could he then take the elements and tell me what I must do with that soil?

Mr. SCHREINER. Yes, sir.

Mr. GILHAMS. That is what we want to know.

Mr. SCHREINER. That is what the man, if he is a good one, will tell you.

Mr. GILHAMS. That is what we wanted to know.

Mr. SCHREINER. You may have a difficulty in picking the particular soil you have in mind, but that is the idea of the soil work, and that is the line along which the soil work is developing.

Mr. GILHAMS. My idea is that you can take this soil-utilization man who has been in the field doing the work and put him in your laboratory, and after you have made an examination of the soil and know the elements of the plant, that he and the laboratory together can tell you what to do?

Mr. SCHREINER. That is it; science plus the field, every time.

The CHAIRMAN. So that as a matter of fact it is not necessary for the soil-utilization man to go onto the soil and conduct plant-growing experiments there in order to tell what to do with the soil?

Mr. SCHREINER. Not necessarily, if the cumulative experience of that soil is already in possession of the Bureau or of the man. If there is a new region about which he knows absolutely nothing, it will of course be necessary to experiment.

Mr. LEVER. But you can not get this experience except from the fact that your man has been on that soil?

Mr. SCHREINER. Has been on the soil. Therefore the soil survey, as it were, is the basis of it all. It opens up the problems and shows where the problems are.

Mr. LEVER. And it is therefore necessary to have a field man always?

Mr. SCHREINER. Always. It can not be done by a single laboratory investigation alone. No progress can be made in the field alone, and no progress can be made in the laboratory alone. It must be through the two combined.

The CHAIRMAN. Then, as a matter of fact, you were mistaken when you told Mr. Gilhams that if he would bring you a sample of soil and tell you what he wanted to grow there you would make a laboratory investigation here from which you could instruct him what to put on the soil?

Mr. SCHREINER. In some cases I might be able to do that wholly and alone from such an investigation, because all the other factors may be well known. If they are not, then we must turn it over to one of the field men who knows that soil region and knows the soil conditions in every way, because the laboratory man making these investigations can not always be familiar with all the parts of the United States, and with all the soil conditions which confront us.

Mr. POLLARD. How does he get this other information you speak of that he must possess? Does he get that through the making of the soil investigations, the soil surveys that are made by these 12 or 15 or 17 parties that are now provided?

Mr. SCHREINER. The specific information he would get in that way. There is other information, however, general knowledge of soil and soil conditions, which he has gotten because of his long connection with the Bureau.

Mr. POLLARD. With the study of the soils?

Mr. SCHREINER. With the study of soils, as it were, for many years.

Mr. POLLARD. Does that have any bearing on what is termed the utilization work?

Mr. SCHREINER. Exactly; it has a great bearing on that.

Mr. POLLARD. What do you mean by that?

Mr. SCHREINER. I would like you to hear Mr. Bonsteel in regard to that.

Mr. POLLARD. Let me ask you this. Have you reached the point in your scientific research where this principle you have laid down to the committee this morning is generally adopted and agreed to by the soil experts and soil chemists throughout the world, or is it a new idea which you have put forward which is not generally known or accepted by the scientific world?

Mr. SCHREINER. The idea that plants excrete is very old, in a way; but it was not proven until the bureau took hold of it, on account of the technical difficulties of proving it. Science had not advanced to the stages, in those days, where they could do it; and then it fell into disuse for half a century longer than that, and since then they have been devoting almost all researches along the mineral side of the soil, and the organic matter has been entirely forgotten, it has been entirely ignored except in so far as that we have said "This soil needs organic matter." We do not know why. "This soil is poor

in organic matter." Such statements as that you will find all through agricultural literature, but they did not know why.

Mr. POLLARD. I wanted to know whether the principle was generally accepted?

Mr. SCHREINER. This principle of there being bodies, toxic bodies, in the soil is being accepted everywhere.

Mr. COCKS. Would not that be true over the areas that had been farmed intensively for a long time?

Mr. SCHREINER. It would be where they have been improperly farmed, and is true.

Mr. COCKS. What do I understand by that?

Mr. SCHREINER. That would be growing a crop continuously, the same crop.

Mr. COCKS. I do not mean that. I mean where we have had a rotation of crops, two crops a year every year for forty years, two crops a year, and very intensively fertilized, and yet we feel that there is something in that soil that prevents a crop from reaching perfection.

Mr. SCHREINER. That is the point. You will find in these market gardens where they have fertilized and fertilized until they have fairly loaded the soil up with fertilizer, and still there is something that prevents the growth of the plant. In France those high market garden soils have been analyzed repeatedly, and they have experimented with them, and they find that it is due to bodies in the soil which have been accumulating for years.

Mr. COCKS. That is a point that is particularly interesting to us in my country—my particular district—because we are very successful farmers down there, and we have felt that we had enough fertilizer to produce a crop, and yet we could not get the crop we ought to have. In other words, we felt that we needed a flux, or something to bring those things to a head.

Mr. SCHREINER. Let me tell you another thing in regard to these soils. The Bureau of Plant Industry has a rose soil, made up of a great deal of organic matter. That soil is full of plant food; it has had manure added to it a plenty, but the roses refuse to grow; the roots rot off. That is due to the effect of something on the roses. Other plants grow in it luxuriantly. Chrysanthemum soils are never used twice; they are always thrown out.

Mr. POLLARD. Could you tell what kind of fertilizer would neutralize the excreta of wheat, for instance?

Mr. SCHREINER. Not in the sense of absolutely destroying it. We have not gone quite that far, so as to get a chemical that will destroy that substance. Oxidation does it, and therefore good cultivation with organic material like manure is very effective, because apart from the mineral matter that it contains, the organic matter in the manure is about as beneficial a thing as we have found up to the present time.

Mr. COLE. That is just what we have been doing in Mr. Cocks's district, and yet that does not answer the purpose. It appears to me that when you get your chemical compound from the analysis of the soil, you ought to be able to determine what kind of chemical will neutralize it.

Mr. SCHREINER. That is the nature and aim of the work, to find a means by which these things can be destroyed; by fertilizer, if

you can, or by systems of cultivation. There are always several ways of overcoming things of that kind. The greatest thing we have found thus far is oxidation of all kinds. I might illustrate here another principle of some of these things; not this specific one for wheat, but another one. Nitrous acid is formed in the soil. I will try not to get too technical, and if I do I hope that you will stop me. Nitrous acid is formed in the soil where processes of nitrification go on. It is the first step of nitrification processes. Now, nitrous acid acts upon some of these organic bodies, uniting with them and forming very unstable compounds, which then decompose and the body is no longer harmful. Therefore, if we induce nitrification of the soils, that very process of producing nitrates is very beneficial in destroying many of these bodies.

The CHAIRMAN. Your position is, then, that for the most part fertilizers are useful in destroying the toxic condition of the soil?

Mr. SCHREINER. It is an important effect and has been one that has been practically overlooked.

The CHAIRMAN. Then do you hold that manure is necessary in any soil for the purpose of supplying food elements to the soil?

Mr. SCHREINER. Oh, yes. You mean plant-food elements?

The CHAIRMAN. Plant-food elements.

Mr. SCHREINER. Yes. I know with regard to the manure, because I have separated the organic matter entirely from the mineral matter of manure, and am able to say that the organic matter is more effective than all the mineral matter in the manure. That, however, is also shown very readily in the field. It is shown by the fact that the use of artificial manure is never so effective as the use of the manure with the organic matter in it. Fertilizing with manure in the form of salts is never so effective as fertilizing with the organic matter plus the salts.

The CHAIRMAN. You do hold, then, that in some soils it is necessary, or at least advantageous, to add fertilizers?

Mr. SCHREINER. Oh, indeed yes; not only this, but a very desirable thing to do. The only thing I am saying is that we have in the past not been properly guided in what particular fertilizers to use, so that it is to a large extent a blind practice.

The CHAIRMAN. A few years ago the Bureau issued a bulletin which was generally construed as meaning to state the proposition that all soils had all the plant food necessary for a maximum growth or crop. The inference, of course, from that was that such being the case one soil was as good as another and the use of fertilizer was not warranted. Now, I would like to know whether the popular conception of that bulletin was wrong or whether the position of the Bureau has changed?

Mr. WHITNEY. That touches on the chemical side of the investigations of the Bureau, and we have Mr. Cameron here, who did the work, and possibly he might answer that.

The CHAIRMAN. I only asked Mr. Schreiner because he has gone rather freely into the matter of fertilizers and I supposed it was within his province. Of course I will refer the question to any man you wish.

Mr. SCHREINER. In that very bulletin is a section on the rôle of fertilizers, in which fertilizers are definitely mentioned as beneficial

to plants, and the use of fertilizers is distinctly advocated. It was there said that the rôle that fertilizers played was something in addition to, and perhaps entirely separate from, the amount of plant food which was supplied by them. In other words, it was already forecasting these very facts that I have been speaking of, because we already had them under investigation, and fertilizers have another action, another rôle, another function to play in the soil besides the plant-food elements they add. I should be very glad, on that strictly chemical thing, as Professor Whitney has suggested, to have Mr. Cameron answer on the mineral side, because this is turning now to the mineral side.

The CHAIRMAN. We will wait until Mr. Cameron comes on, and we will ask this question again. It has not been answered, and I think in view of the very acute discussion on that particular topic that has been carried on through all the agricultural journals of the country it would be rather interesting to have it answered.

Mr. COCKS. Have you ever tried the application of anything to the soil that was not a plant food to overcome these toxic conditions?

Mr. SCHREINER. Yes; we have tried a great many things.

Mr. COCKS. And you have found nothing efficacious?

Mr. SCHREINER. Yes; we have found many things, but not anything that we would like to put into the hands of the farmers as yet. Scientifically we have found things.

Mr. COCKS. But not commercially?

Mr. SCHREINER. We have found some things. Commercially I would not yet suggest them, because of their high cost from an agricultural point of view.

Mr. POLLARD. I understand from reading this bulletin on soils and from your discussion of the question that, whether the fertilizer is in the form of manure or not, the effect derived from its application is along the line of destroying these excreta of the plant rather than of furnishing plant food; is that correct?

Mr. SCHREINER. That is the idea.

Mr. POLLARD. For instance, when manure is applied to the soil, does that give any plant food to the plant or does it simply act on this excreta, the poisonous element?

Mr. SCHREINER. It does to an extent. The plant food is introduced and is utilized by the soil; but the largest effect which that manure is adding is to improve, either by acting upon the thing there or enabling the plant to resist it. It improves the sanitary conditions of the soil, if I may put it that way.

Mr. POLLARD. I live in Nebraska. We find out there that a field that has been cultivated in grain for a number of years, when it is put in clover or alfalfa or timothy or some other grass and is allowed to remain seeded in grass for a number of years and is then broken up, will produce two or possibly three times as much corn as it did before, without any more cultivation than was formerly given it. Do I understand from that that by simply permitting the soil to rest the lapse of time destroys these excreta of the plant that are injurious to it?

Mr. SCHREINER. The lapse of time does a great deal; but the other plants in the meantime have been also working. In other words, it is this way—a factor that has been practically ignored in agriculture—that the plant affects the soil. That is the burden of my whole story; the plant also affects the soil.

Mr. POLLARD. Then it would be the alfalfa plant that helps to destroy the excreta?

Mr. SCHREINER. Helps to destroy these organic substances and purify the soil. There is an article just published in one of the scientific journals of France on this very thing of the alfalfa itself. The alfalfa is making the soil toxic for itself, and the alfalfa is refusing to grow in some of the fields in France to-day. It has ruined that soil, so to speak, for itself, but not for a different plant.

Mr. POLLARD. Then I understand that in Mr. Cocks's district, if these truck patches which have been so intensively cultivated for a number of years were put into alfalfa or some other grass and allowed to rest for several years, the soil would be restored to its former state and would be as productive as it was formerly, without the use of fertilizers until the soil became poisonous again?

Mr. SCHREINER. Became poisonous.

Mr. POLLARD. Is that correct?

Mr. SCHREINER. That is correct. That would be one way of remedying soil conditions and putting the soil in proper shape.

Mr. POLLARD. Then I understand from your Bureau that the best way to destroy these toxic conditions of the soil is by the rotation of crops rather than by the application of fertilizers; is that true?

Mr. SCHREINER. It is more effective that way than by the application of fertilizers, although a judicious application of fertilizers along with the crops aids those crops in helping to remedy the soil conditions.

Mr. POLLARD. But it only puts off the evil day?

Mr. SCHREINER. I would not say that, because I have pointed out to you that fertilizers themselves have a great action in renovating the soils, and making them pure and sweet.

Mr. COCKS. You would not say that a rotation of crops would answer for an application of fertilizer?

Mr. SCHREINER. A rotation of crops with a plowing under of green manure would, even if you apply no nitrates at all.

Mr. HAWLEY. After a crop of wheat or oats is grown on a field for two years, say, if you then plant it to vetch or some other legume, will the legume purify the soil?

Mr. SCHREINER. It will help a great deal, especially if that legume should be plowed under. The green manure is also under investigation, and we find that the organic matter that arises from it is also very beneficial.

Mr. HAWLEY. So that you think that the cropping of the ground with vetch would help?

Mr. SCHREINER. Yes; the cropping of the ground with vetch would help.

Mr. HAWLEY. And if you plowed under a later crop of the vetch and let that green manure remain in the ground, that would still further help?

Mr. SCHREINER. That would still further help. These so-called practical questions can be answered very much better than I can answer them by the soil-utilization man, who is also to appear before you, I believe, with your permission, and answer many of these practical questions, utilizing these very investigations of which I have been speaking.

The CHAIRMAN. Do you hold that all plants eventually run out by reason of the fact that they poison the ground in which they grow?

Mr. SCHREINER. All plants will, except in so far as we find continuous and natural associations of plants in nature. We may have them persist for years. But you know this is a law of nature, that the excreta of one thing is always poisonous to itself. It is the law of all animal nature, of all bacterial nature. It is a law of nature merely that I am giving to you here. But it is a law of nature that the excreta will be toxic to that plant; and you know how it is in the animal system, if you do not get rid of the excreta of the animal, it dies within twenty-four hours from poisoning. It is the same way with plants. We must get rid of these. The soil either takes care of them or they will remain as poisons. The soil must be porous enough so that the atmosphere can get in or there must be processes in the soil which destroy them. If we have such a process, the soil will be good, especially if we plow along with it and stir up the soil; so that in many regions the yield is not only not decreasing, but it is increasing under cultivation, which is true in some of the Washington wheat fields, as I understand.

The CHAIRMAN. How are we to account for the persistence of prairie grass, which has probably been growing for many years?

Mr. SCHREINER. It has been subsisting for many, many years. Of course I have not investigated this, and can not answer definitely, but to illustrate the idea of such a condition as you mentioned you have this prairie grass which has been growing for years. It is established. It finds the proper soil condition there. That is why it grew there naturally. It selected that region to grow in. It grew there and developed at the expense of everything else, and there is a condition there by which the excreta of this grass, let us say, is destroyed continuously. Now, if you disturb that condition, the grass will not grow.

Mr. HAWLEY. Why should it destroy its own excreta, and wheat not do the same?

Mr. SCHREINER. There is another thing that comes in. It has adapted itself to that condition. You can grow a wheat or some other plant and adapt it to a certain soil; you can eventually, so to speak, breed that up so that you can get splendid yields from that soil. But if you transplant the seed from this to an entirely different environment, to a soil where the excreta are not taken care of, that same yield will go down and down. That is why the farmers are so frequently disappointed in seed. They have been bred under certain soil conditions and certain surroundings, and you transplant them to other conditions and you don't get the expected results. If you disturb the prairie grass and plow it under, it is very hard to get prairie grass to grow again. You disturb that delicate adjustment nature has made.

The CHAIRMAN. Consider cockleburrs and how they grow.

Mr. SCHREINER. You have got me now.

The CHAIRMAN. Why do you not work on the evil as well as on the good, and why will not cockleburrs run out?

Mr. SCHREINER. As far as that is concerned, if you were to plant them under certain conditions, you might get different results. Many of these things that grow so luxuriantly wild, if you try to cultivate them, if you try to grow a field of them, you will see how soon they run out. Take the commonest weeds by the roadside, that are gathered as drugs, and you try to cultivate them, and you get very disappointing results. Take those weeds like the monarda species, take the horsemint which grows in Wisconsin and the closely

related wild bergamot, and try to cultivate those. Some of them are very valuable articles of commerce, but if you try to grow them, it is quite a different proposition. Try to grow them the way you do an ordinary agricultural crop and it is quite a different story from the natural scattering in bunches.

Mr. COLE. That same principle applies to the human race, does it not?

Mr. SCHREINER. Yes; exactly.

Mr. COLE. You try to cultivate the Indian, and he dies out.

The CHAIRMAN. Have you anything further to say?

Mr. SCHREINER. Unless there are some questions, no, sir. I could say a great deal more on these questions, because I am highly interested in them.

Mr. GILHAMS. One more question. If you had a utilization man in Alabama and he understood the climate and the soils of Alabama, then if you put him in your laboratory here and you should get samples of soils over the State of Alabama, could he tell those planters what to grow in that soil?

Mr. SCHREINER. He could.

(At 12 o'clock m. the committee took a recess until 2 o'clock p. m.)

COMMITTEE ON AGRICULTURE,
HOUSE OF REPRESENTATIVES,
Tuesday, January 28, 1908.

AFTERNOON SESSION.

The committee met at 2 o'clock p. m., Hon. Charles F. Scott (chairman) in the chair.

The CHAIRMAN. We will resume consideration of the estimates for the Bureau of Soils.

Mr. WHITNEY. Mr. Chairman, just before we adjourned for lunch the question was raised as to the misinterpretation of a bulletin issued several years ago by the Bureau of Soils, from which it was gathered that the Bureau was not in favor of the use of commercial fertilizers. In order to meet the question that was raised in the committee and put the Bureau straight, I should like to have Mr. Cameron read a short extract from the bulletin, showing exactly what we said, so that it will go into the record.

The CHAIRMAN. Very good.

Mr. WHITNEY. Then I do not care to take up much time of the committee on this phase of the work, but I would like, then, to have Doctor Bonsteel take up the soil utilization work.

STATEMENT OF MR. F. K. CAMERON.

Mr. CAMERON. Mr. Chairman and gentlemen, this bulletin was the result of an investigation of the mineral chemistry of the soil. There are about 450 different kinds of soils now known, and it is not an impossible problem by any means for anyone with a very little trouble to learn these soils of the United States. Then the question came, what are the differences between these soils and what are the things that are alike in them? It was generally believed that the

differences in the soils were mainly chemical ones and that opinion is still true, but not as it was supposed at that time. That plants deal with a soil solution as their immediate food, and that there is sufficient of the constituents of plant food in the soil for the needs of the plants in most cases, and that the differences must be due to some other thing than these differences has been called to your attention by Mr. Schreiner. It was necessary to check this up in the field investigations, and as it was an exceedingly difficult problem, methods were first devised and proved to be workable.

We started out to investigate the composition of the great nutrient medium of the plant solution, with special regard to the mineral nutrients on which the plant grows, and as a result of that it was shown that there was no possibility of correlating the concentration of the soil solution with the growth of the plants upon it, so that you would get a good crop with a small amount or a large amount of mineral matter. It was further shown that these substances which are derived from the minerals of the soil vary but little. Minerals are soluble, giving this nutrient solution on which the plants feed, and it was shown that the concentration does not vary greatly. The question was then raised as to what fertilizers do, and the Bureau has continued the investigations as to what fertilizers do. We have only three great methods of control in the soil management—cultivation, which we know a great deal about; crop rotation, which we are now learning a great deal about; and fertilizers, which we know very little about at the present time and are trying to learn something about. All three of these methods are used and should be used. The question was then raised, What are fertilizers? which question the Bureau is answering by this continued investigation. It was realized, as the result of investigations in the laboratory and in the field, that the theory that fertilizers were used mainly for the plant-food value was incorrect. Nevertheless, the Bureau has always recognized the use of fertilizers, and in this very bulletin which has been criticised; and I ask that the following paragraph, showing the attitude of the Bureau at that time, which has not changed in the slightest since that time, be made a part of this record. I read from page 58 of this Bulletin No. 22 of the Bureau of Soils:

There is no question that in certain cases, and in many cases, the application of commercial fertilizers is beneficial to the crop. The experience of farmers, the enormous sums expended for commercial fertilizers, and the many experiments carried on at the experiment stations prove that under certain conditions fertilizers are very beneficial in increasing the yields of crops. The fundamental idea under all of this work, however, has been that of supplying plant food in an available form; that is, adding to the supply existing in the soil. It is significant that other conditions of growth have so much influence on the yield that in but very few instances, even after long-continued experiment, has it been demonstrated that any particular fertilizing ingredient or ingredients are required for any particular soil, and that even then the effect of the fertilizer varies so greatly from year to year that no specific law has been worked out, even for a particular soil, from which the fertilizing requirements could be deduced in any exact manner.

You will see, then, that the scientific quarrel—if it can be dignified by this name—has been as to the function of fertilizers, not at all as to the use of fertilizers.

I have nothing further to say, unless you wish to ask me some questions.

The CHAIRMAN. I remember hearing an address that was made at Jamestown some time during the summer by some more or less dis-

tinguished soil expert, whose name I regret to say I have forgotten, in which he took occasion to say that the Bureau of Soils of the Department on this question, as I remember his contention, was in error, and that the error of the Bureau lay in confounding the elements of plant food with the available plant food in the soil. He illustrated it by saying that there existed in the furniture of the room and in the carpets the elements of human food, but it was not in available form for human consumption, and he seemed to think that your Bureau had confused those two things; that because you found by your research and analysis that all soils had within them the elements of plant food you then jumped to the conclusion that those elements were alike available in all soils, so that, as a matter of fact, in point of plant-food value there was practically no difference between the poorest soils and the best; and he went on to say, as I recall it, that real estate agents had taken advantage of that, some of them in good faith and some of them maliciously, to foist off upon innocent purchasers a lot of land that was poor in quality and of little value, upon the assurance that the Bureau of Soils had said that there was enough plant food in every soil to support the maximum of plant life. Did you happen to read that address?

Mr. CAMERON. Yes, sir; and I am thoroughly familiar with the subject you refer to.

The CHAIRMAN. What would be your answer to that?

Mr. CAMERON. In answer to that, in the first place I would say that the Bureau has not encouraged real estate dealers in the slightest. The charge was made originally by Doctor Hopkins and has been repeated since by him and others, but as a matter of fact there were three editions of Bulletin No. 22 (8,000 copies) published, and those have been distributed mainly to scientific men, and it is very improbable that they have gotten into the hands of real estate dealers at all. Secondly, I would say that the main opposition to this view has been from Doctor Hopkins, from the University of Illinois.

Again, the Bureau does contend that the soil contains enough plant nutrients to support life and give good crops, for it has been shown scientifically in this country and abroad by many investigators in the past, and by numerous recent investigations, that all soils contain practically all the common rock forming minerals. Now, it is a principle of chemistry that when a solvent is brought in contact with a substance, that substance will go into solution until there is a state of equilibrium between the quantity of the substance outside and inside; in other words, we get a saturated solution. If these rock-forming minerals were in all soils we should have the same solution in every soil, and that has been shown to be the case. There are various variations, due to absorption, perhaps, of the soil. In the first place, I must ask you gentlemen to remember that the soil and the plant and the water in the soil is moving. The soil grains are constantly moving, and the solution in the soil is constantly moving, and the growing plant is constantly moving. If a plant stops for a moment it dies. The soil solution can not stop for a moment, because it has to be moving all the time. When water falls on the soil part of it runs off the surface, and part of it runs through the surface by gravitation and comes out in the subsoil, and part of it starts and rises as soon as we get sunlight on the surface, and this part comes up in films

over and through the finer spaces, and is bringing with it dissolved material from below.

The water that falls and goes through down and out goes rapidly through larger openings, and gets very little of the soluble material, because it is not long in contact with the soil grains. It gets some by reason of the fact that, as we know, our springs and rivers and wells are all soil solutions and carry mineral matter. Now, the water rising by capilarity can not get very concentrated because it gets saturated with the minerals, and any excess that is contained in it is thrown out, except in extreme conditions, as in the West, and then we get alkali conditions; but under ordinary humid conditions we can not have an excess of it, and the soil solution is bringing materials from below which the plant gets, and as a matter of fact the most important discovery of the Bureau of Soils in recent years is that plants are feeding on material from the subsoils, far below where the roots go. If this is true, and there are many other arguments in the same line, it is absurd to make an analysis of the surface soil and say that is the soil that the plant is feeding on. It is not. The solution is changing around the plant roots, and it is not the surface material alone on which the plant is feeding.

Now, I am sorry to say that I shall have to make this personal, but in Illinois they have been carrying on a long series of experiments and have been making analyses of the soils, and they stated that in the soils of Illinois there are just so many pounds of nitrogen and so many pounds of potash and so many pounds of phosphorus, and we know what a corn crop will take out of the soil, and therefore we can say that a corn crop will take out so much each year, and these soils will last only a certain number of years—I hesitate to say how many, I do not recollect how many—I think about fifty years. The work we carried on, which was largely given in this bulletin which has been criticised, absolutely overthrows that contention. The soil is changing; it is constantly supplying the material of the soil solution, and we know that soils have lasted thousands and thousands of years, and we have records of soils in India that have lasted two thousand years, and we know they do not wear out, and we gave the explanation why they did not, and why the land did not become a sterile waste, and it naturally aroused a feeling of opposition in the breast of this gentleman.

The CHAIRMAN. When you say that all soils contain all the elements of plant food, and there is in those soils at all times a saturated solution of which all those elements of plant food make a part, do you not practically say that all soils have all the plant food they need, and that it is at all times available for the plant; or is it not available for the plant if it is in a saturated solution?

Mr. CAMERON. Certainly, if there is water enough; if the soil is moist.

The CHAIRMAN. Is it not therefore a justifiable inference from what you have said, that there is all the time in all soils enough plant food available for plant life?

Mr. CAMERON. True; perfectly true as regards the mineral nutrients.

The CHAIRMAN. Then I come back again to the question, Why is it necessary, or is it in your judgment necessary, ever at any time to introduce fertilizing material into any soil for the purpose of increasing the amount of plant food in that soil?

Mr. CAMERON. Not in my judgment.

The CHAIRMAN. Then in your judgment the only reason for the introduction of fertilizers is for the antitoxic effect or the mechanical effect they may have on the soil.

Mr. CAMERON. Mainly that, but there are probably other functions of fertilizers that we know comparatively little about. We know that certain kinds of life, bacteria, molds, can grow in certain solutions of salts, and can not in others. It may be that fertilizers affect them. But all that is an unexplored field, and little is known about it.

The CHAIRMAN. As a practical matter, it really makes very little difference, does it not, why it is necessary to have fertilizers in order to get the largest yield, if it is found that you do get the largest yields by introducing fertilizers?

Mr. CAMERON. No, Mr. Chairman, it is not an impracticable question at all, because the whole problem that we are facing, and the reason why we are carrying out this investigation is to get a rational system of using fertilizers, and we can not hope to have a rational system and know how and where to use them until we know how they act.

The CHAIRMAN. That is what you are trying to find out?

Mr. CAMERON. Yes.

Mr. POLLARD. I understand there are certain fertilizers that are applied to certain soils?

Mr. CAMERON. Yes.

Mr. POLLARD. And other soils require other fertilizers?

Mr. CAMERON. Yes.

Mr. POLLARD. If all soils have the necessary ingredients to produce plant life, what difference does it make what kind of fertilizer you apply to a particular kind of soil?

Mr. CAMERON. Because these different fertilizers have different effects on the oxidizing power of the roots and different effects on the organic substances in the soil.

Mr. POLLARD. Then do I understand from that that there are other properties of the soil that furnish food to the plant?

Mr. CAMERON. Certainly.

Mr. POLLARD. And affect the growth of the plant?

Mr. CAMERON. Certainly. We do not know anything about the plant food that is furnished in the soil, as a matter of fact. We do not know whether potash is taken up as potassium chloride or as potassium sulphate, or how it is taken up.

Mr. POLLARD. You do not know how it is taken up?

Mr. CAMERON. No; that knowledge must be the result of further study. We do not know it yet.

Mr. HAWLEY. In the application of fertilizer to soil does it change the composition of the soil and allow the moisture——

Mr. CAMERON. To move differently?

Mr. HAWLEY. Yes; to move differently.

Mr. CAMERON. Yes, sir. Those effects are sometimes small and sometimes very great; but if you will allow me to say one more word about fertilizer: What are fertilizers? What are the characteristics that a substance must have in order to be a fertilizer? It must be obtainable in large quantities. It must also be cheap. Now, the substances which are used as fertilizers in fertilizing material are substances which can be obtained in large quantities. They

are the substances, and are the only substances, which we can get hold of that we can get in large quantities that we can get cheap, and with one exception, that is sodium chloride—common salt. It has not been much used as a fertilizer, because it has not any so-called plant food in it; and yet it has been used in quite a large number of experiments on quite a large scale, and wherever it has been used it has generally been found to be quite a good fertilizer. In the investigations of the Bureau we have used pyrogallol. It contains no plant food, but carbon, hydrogen, and oxygen, yet nevertheless it is a powerful fertilizer; but it can not be obtained cheaply. It is worth over \$2 a pound, and nobody would think of recommending it as a fertilizer.

Another function of a fertilizer must be that it is more or less soluble, because after all plants can only take up those things that are soluble. The part of the plant that does the feeding is the extreme tip of the root, and that keeps moving. If it stayed still, it would soon stand in a mass of its own effluvia, as Mr. Schreiner explained, and it would die. We do not know how the extreme tip, the feeding part of the root, takes up the material. We do not know whether it takes the potassium as potassium sulphate or as potassium chloride. We do know that when you put potassium chloride on a soil you get one effect, and when you put potassium sulphate on a soil you get another effect. But the ordinary chemical analysis, the ordinary view which has prevailed up to quite a recent time as to the function of potash, has not recognized that. We would make an analysis and get potash. As a matter of fact, nobody ever uses potash as a fertilizer. It is potassium sulphate or potassium chloride that is used, and we have absolutely no idea as yet as to how it is taken out of the solution. I have speculated on it and written papers on it, and others have done the same, but we have no proof as yet as to how it is taken out. What the Bureau has done is to show that they do assist the plant itself in taking care of the organic substances in the soil, both the mineral and organic substances, and that is the sum total of what we know about fertilizers to-day.

Mr. POLLARD. To come back to your proposition that you began with, do I understand that, aside from climatic conditions, all soils will grow cotton and all soils will grow corn and all kinds of soils will grow wheat and the different cereals and other plants?

Mr. CAMERON. It is possible to grow any plant on any soil, but it is not economic to do so.

Mr. POLLARD. Why is that? If all soils have all the properties that are necessary for plant food, why is that the case; that is, laying aside the climatic conditions?

Mr. CAMERON. First there are the climatic conditions to be considered, and in the second place there is the texture of the soil, the rate at which it can supply moisture, the way it is aerated. Some plants require a very loose soil to grow, and others an exceedingly large amount of air, possibly to oxidize their excreta. We do not know that.

Mr. COCKS. A large amount of air?

Mr. CAMERON. A large amount of air. Other plants like a wetter and closer textured soil. In the eastern part of the United States we regard the heavy clay soils as ideal wheat soils, and we do not regard sandy soils as at all adapted to wheat; but in the West, in the semi-

arid country, they prefer light soils for wheat. So that we have as factors in the productivity of the soil its texture, its water-holding capacity, its chemical characteristics, and also the climate, and you can not divorce one from the other.

Mr. POLLARD. Is that theory about all soils containing all the necessary constituents of plant food generally held by all scientists?

Mr. CAMERON. It is accepted by the physical chemists, and by the majority of plant physiologists, and by a large percentage of the agricultural investigators.

Mr. POLLARD. Throughout this country?

Mr. CAMERON. Throughout this country and Europe; more in Europe than in this country. We have received far more recognition abroad than in this country, but the acceptance of it is growing very much more rapidly. Within the last two years several of us have lectured at the agricultural colleges and have explained these views, and have shown that the criticism which came to Bulletin No. 22, of which I have spoken, was largely incorrect, founded on false premises, and as a result of that we have a large mass of evidence in the form of letters, and other evidence in the fact that a number of agricultural schools are now teaching this, and are using our bulletins as text-books, that these views are accepted everywhere.

Mr. POLLARD. You have reached a point where there is no question about the soundness of that view?

Mr. CAMERON. I feel absolutely sure of it, and I think there is no question but what 90 per cent of the scientific men of this country would back that up.

Mr. POLLARD. The reason I asked this question is that it seems to me that all of the bureaus—I do not say it with reference to this Bureau in particular, but all the bureaus of the various Departments at Washington—ought to be very careful about sending out matter of that kind unless they are sure, unless they have proven their ground, because it is likely to mislead and make trouble. That was the reason I asked the question.

Mr. CAMERON. There has not been a publication on the subject of soil fertility going out from the Bureau of Soils—and I think I can speak advisedly, for every one has gone through my hands—in which we did not have the experimental proof long before the publication went out, and that this is being recognized I think I can claim by the fact that a number of agricultural colleges in the country are using our bulletins as text-books. I have recently come from a lecture trip extending from Louisiana to Michigan, and I found everywhere that this was being taught, and, as I say, our publications are being used for text-books.

Mr. COOK. In making your determinations of soil samples, to what degree Fahrenheit do you dry a sample before you make your determination?

Mr. CAMERON. I do not quite understand your question.

Mr. COOK. When you take your sample of soil to make your analysis, how many degrees Fahrenheit do you dry that sample to before you make your analysis?

Mr. CAMERON. We do not dry it at all. In fact, we do not heat it at all. We let it stand at the ordinary temperature of the room.

Mr. COOK. Do you not have to dry the moisture out before you can make a correct determination?

Mr. CAMERON. No; we do not do that, for the very good reason that drying it is likely to change the nature of the organic matter in the soil, and we prefer to keep it moist, and do it as much as we can.

Mr. COOK. In making determinations of all samples of valuable metals, do they not have to dry the moisture out, and do they not heat them to a high temperature?

Mr. CAMERON. Yes; but that is a very different matter. That is exactly where the old-line analytical chemists differ from us. They determined the constituents, not the substance itself. The very criticism that is made on us is that we are the only ones trying to get the substance itself. These other men have been trying to get the chemical constituents, potassium and nitrogen and phosphorous, and to do that we have well-known analytical methods, and they dry the soil first so as to have a basis on which to compute the percentage of this, that, or the other thing. But there is no way of getting at the soil so as to get the substance itself, to get just these undesirable properties, and this is the first serious scientific effort that has ever been made in the history of the world to do that.

Mr. HAWLEY. That is, I understand if you dried the soil, some very valuable matters would be lost?

Mr. CAMERON. Yes; in the case of this cow-pea sick soil that Mr. Schreiner spoke of this morning, the substance that is causing the trouble is volatile, and if we dried the soil we would lose most of it by its gasifying and passing off with the water vapor.

Mr. GILHAMS. Then you are endeavoring to discover the gases that are in the soil?

Mr. CAMERON. No; all substances are gasified at some temperature or other, and some substances gasify more easily with water or alcohol, or something of that kind, and therefore we would not dry the soil for fear that these injurious substances would be gasified and pass away with the water.

Mr. GILHAMS. What substances do you get in the soil?

Mr. CAMERON. I should want to refresh my memory on that. We have a large number of substances which we have recently discovered in the soil, and we have about seven that we have positively identified and gotten out of the soil. One of them is picoline carboscylic acid, and another one is dioxystearic acid, which Mr. Schreiner spoke of as coming from the cotton soil in Tennessee, and that is an exceedingly poisonous substance, and is found in many of these soils, and I think you have here a vial of that toxic material that has been taken out of the soil. We have tried these in artificial cultures, and find they have exactly the same effect as the substances in the soils, so that that work has been thoroughly proven.

Mr. WHITNEY. After this presentation of the chemical side of the bureau, I would like now to go back to the soil utilization work, and I would like to have Mr. Bonsteel present the details of that.

STATEMENT OF MR. JAY A. BONSTEEL.

Mr. BONSTEEL. Mr. Chairman and gentlemen, possibly you will pardon me if I say that I have gathered from the questions and discussions that have been presented to my colleagues and to Mr. Whitney that there are certain points in regard to the soil utilization work that I should dwell on, since they were not free to dwell on all the details of that work. For instance, the relationship of my own work to that of the other members of the bureau, to the soil survey, and Mr.

Schreiner's investigations of these toxic principles,—these toxic materials—which are put off into the soil, and Mr. Cameron's investigations of the mineral portion of the soil—all that—their relationship to what use the soil can be put to, and exactly how that soil shall be treated in order to produce crops. That might be one of the interesting subjects; or I might take the work of my own division, the work of soil utilization, which consists of bringing the results of research in the laboratory and in the field together to make up a body of practical knowledge which the farmer can apply to certain conditions. That is what I assume to be the function and use of the division of soil utilization.

Now, there have been mentioned by the different specialists certain lines which they investigate. The soil-survey man is making his survey in the field to determine the exact character of the soil, its texture, its derivation from certain geological bodies, rocks or otherwise, all of which constitute a part of the history of that soil and give that soil its actual existing properties. The soil-survey man puts on the map the extent and boundaries and location of that particular body of soil, and later on, as he makes another survey in another part of the country, he determines whether the soils that he is seeing in the second case are the same as those which he saw in the first case, and, if so, whether the properties are the same, or whether some climatic factor, some drainage factor, some topographic factor has entered in to change the kind of plant that can and should be raised in that locality. And this is probably the fundamental use of the soil survey, to identify our soil friends as we would our human friends, to get to know them in their own homes in the field, and to know what they are capable of from the standpoint of the practical farmer, the man who is dealing with these soils.

Now, he is continually encountering—this soil survey man—as he enters on his work, special problems. A farmer will come to him and say, "Here, I have used a commercial fertilizer on my soil endeavoring to raise cotton"—or corn, or wheat, or whatever the case may be—"and I have used it for two or three years, and at the outset it gave me good results, then it did not give me as good results, and now I find that it will give me no results at all and there is a necessity for a change." There is a problem presented to the soil-survey man which he can not solve himself. It is something occurring within this body of soil which it requires the laboratory, the microscope, and a specially trained man to investigate further. That problem will be submitted to one of my colleagues, either Mr. Cameron or Mr. Schreiner, for his expert testimony, for his knowledge of the facts, for his examination, to see what has occurred—whether the organic matter in the soil is somehow out of condition and fails to perform its functions, whether the mineral matter in the soil is in such condition—I will not say so soluble, but in such condition—that under the existing conditions the aeration, the moisture supply, or the organic matter supply the crop needs is not there, or whether it can not get what is actually there.

MR. POLLARD. I understand, then, that the idea is, whether the poisonous substances that the plant has secreted have not been destroyed and are present in the soil and affecting the growth of the plant?

MR. BONSTEEL. Yes; I think this covers the point. The question depends upon the interaction between the organic matter in the soil, the mineral matter in the soil and the plant which grows on the soil—that is, whether that interaction is so well balanced that a good

healthy plant can be produced. The trouble may be with the moisture contained in the soil, the trouble may be possibly with the kind of seed planted on that soil, the trouble may be with the organic substances which have been put into that soil, or the trouble may be any one of a half dozen different kinds—actual soil sickness. That describes it as well as anything I can mention. Now, we know this in farm practice, and I know it in my own farm practice, that it is possible to select a fertilizer, no matter what its function is, that will produce plants on a given soil for a given period of years, and at the end of that time instead of that same fertilizer we need something totally different. It has done all that it can do for that soil, and some change must be made.

Mr. POLLARD. What is the reason of that?

Mr. BONSTEEL. I do not know. That is the kind of a problem for which I should select specimens of the soil and of the plants that grew on that soil and present them to Mr. Schreiner and Mr. Cameron for their opinion and for their decision.

The CHAIRMAN. You are not an expert soil physicist, then?

Mr. BONSTEEL. No; I am not an expert soil physicist nor an expert soil chemist, but one who has studied soils from the geological origin side, the question of the origin of these soils and the methods of their formation and their geographical distribution, their natural adaptation to plants; that is, from the farm standpoint, that is, rather than from the laboratory standpoint. Are there any further questions?

The CHAIRMAN. Would not that condition you have described indicate that the plant has exhausted certain properties from that soil that are necessary to produce plant growth?

Mr. BONSTEEL. If you had asked me that question five years ago, in the state of knowledge which we had then, I should have answered it "yes;" but when you ask it in the light of the knowledge which Mr. Schreiner and Mr. Cameron have been able to bring up and present to the committee here, I should probably say "no."

The CHAIRMAN. And five years from now you may give an entirely different answer to the question?

Mr. BONSTEEL. Five years from now the state of knowledge may be such that I could answer any specific question of that kind in detail.

The CHAIRMAN. Does that mean, then, that publications of this Bureau made five years ago, announcing positive, settled conclusions have been made upon insufficient data?

Mr. BONSTEEL. No, sir; I would not consider that so at all. I simply said that in all science, whether soil science or any other, we must go ahead from the known ground, stating the conclusions from what we know, to the unknown ground, stating a conclusion with greater exactness, with greater truth, as the years go by. In other words, taking the specific case of Bulletin 22, it stated all that was known at that time, and such conclusions which might be drawn at that time; and the investigations of the Bureau for the three years which have followed that time have shown that in nearly every case the conclusions, as far as they were drawn, were correct and were within the limits of a probability and a possibility. That is, I am simply calling to your attention progress of a particular kind of science, in the same way that we have progress in astronomy and progress along other lines.

The CHAIRMAN. The question I had in mind was whether as long as it is still progress, as long as it is still a matter of investigation and

research and experiment, you do not run pretty serious risks in announcing positive conclusions?

Mr. BONSTEEL. I do not know where there has been a case of that kind, Mr. Chairman, where we have announced any positive conclusions before we had the positive evidence. I thought that Mr. Cameron made that exceedingly clear in stating that there had been no publication from the Bureau of Soils where the experimental evidence was not back of the publication when it was made.

The CHAIRMAN. My remark was only called out by your own observation that five years ago you could have said positively that the condition was due to the exhaustion; now you say, with equal positiveness, that it is not so.

Mr. BONSTEEL. That is, five years ago, even four years ago, I should have had a certain basis of scientific knowledge back of me which would have been the ordinary analytical method of the laboratory chemist. No other opinion would have been available to me as a farmer in answering a question of that kind. Now I must take in additional information which has been developed since that time, and that additional information would lead me to say "no" to that specific question. In other words, it is simply that we have more knowledge now than we had four years ago, and that increase in knowledge requires a different answer to a specific question of that kind. It would be the same as though we should ask a gentleman at the present time as to what was the function of the canals on Mars. He might give us an answer, but he might find out more within the next two or three years and give us a revised answer at that time.

The CHAIRMAN. There is a very large practical difference, of course.

Mr. BONSTEEL. Yes; there is a practical difference.

The CHAIRMAN. The announcement of a positive conclusion by any bureau of the Department of Agriculture may lead to the investment by the farmers of this country of large sums of money. If that conclusion proves to be wrong, not only have they lost their money, but the Department of Agriculture is discredited. It all leads up to the conclusion that all these departments must be extremely careful about making any positive announcements, because of the great responsibility depending upon them.

Mr. BONSTEEL. I think that Mr. Cameron answered that form of the question more completely than I could, that no information had been passed out by the Bureau of Soils at any time until such a time as the absolute, positive, experimental proof was on hand to substantiate it.

Mr. McLAUGHLIN. You say your conclusions have differed and you say that your methods of reasoning have been correct; then your premises must be different.

Mr. BONSTEEL. Pardon me. The point that I was making was this: Between the period of five years ago and the present time there has been an advance step in the science of agriculture. In the darkness of five years ago I could have given an erroneous answer to a question of that kind; in the light of present developments I could probably give the correct answer.

Mr. POLLARD. But that would not affect the investment that some farmer made in the enterprise based on the information from your Department.

Mr. BONSTEEL. If he based it on the information we have at present, which is correct and the only information we would care to

to give out, his investment would be safe. But if he based it on erroneous information given him by some analytical chemist five years ago, his investment would not have been safe. In other words, the error would have been due to outside influences rather than laid at our door.

Now, the question of the relationship of the soil utilization to the soil survey I need to bring out a little more fully. I want to use a concrete example, because I believe that I can cut out a great deal that might otherwise be abstruse by the use of a concrete illustration. In the State of New York, for instance, we began soil-survey work first in the northern part of Chautauqua County. We found certain soils existing there. That work was continued the next year by soil-survey work in Chemung County. We found some of the same soils there. Later on that work was undertaken in Tompkins County, N. Y., and the same soils were encountered again. Later on in Madison and in Broome counties, N. Y., the same soils were encountered again. In 1901 we had only a limited amount of knowledge of these soils, because we had encountered them at one place; but there was indicated to us a very serious soil problem which was not connected with the soil survey work directly; that is, it was not connected with the area and distribution of a particular type of soil which the soil survey determined. It was connected with laboratory research into the reason why these soils were not producing satisfactory crops. When the soil survey had progressed through five counties the problem was outlined. No single survey could give the laboratory sufficient information to find out what was the difficulty with those soils. In fact, I carried on in Tompkins County personally some further investigations in regard to the character of those soils, inquiring of individual farmers even more fully than I would ordinarily do, what in their experience had been wrong along the line of this problem. The farmer says: "Why is it that red clover, which has been grown here by our grandfathers, by our fathers, and by ourselves ever since the first clearing of this land, will no longer grow?" There are several possible answers in a case like that. It might be a purely plant problem; that is, of some fungous disease attacking red clover. It might be purely a seed problem, impure or sterile seed, and it might be purely a soil problem or some condition they have in their soil which made it impossible for red clover to grow.

Now, those same soils produce corn and oats and timothy hay, but not clover; they have produced alsike clover, but not red clover; so we had, then, our problem outlined. It is the same old problem of the red clover plant growing successfully for a long series of years while the soil was in good condition and capable of taking care of the excreta from the red clover, but from time to time, with the accumulation year after year of this excretal matter in the soil, a stage was reached where red clover would no longer grow. That question has been submitted to the laboratories and they have given us not only a scientific solution of the difficulty—that is, that the red clover has excreted something into the soil—but they have given us also, without a doubt, the remedy for that difficulty, which of course to the practical farmer is the thing he is after. He wants to know how to raise red clover, and not what is the matter with it.

Mr. POLLARD. Did that solution come from the laboratory?

Mr. BONSTEEL. It came direct from the laboratory. That solution needed to be tested by certain experimental work before it could be

given out with all of the assurance that the Department of Agriculture should have. When it gave us the solution in that case, we needed to observe in the field to see what the practical farmers were to do. We needed to raise some of that red clover ourselves under the methods in the laboratory in order to say that our remedy was correct. The remedy is this—not the application of any plant food whatever, but the application of lime. I think that concrete example will show the steps by which we must approach and eliminate all other questions except the soil question, in this case and in other cases. Bring it down to the proper basis of finding out first of all what the soil problem is, then the solution, and then the application of that solution in the field. The Division of Soil Utilization is endeavoring to bring directly to the farmer this particular answer, put it in his possession, show him how it works out, and give him an opportunity to raise red clover, and that is what the farmer wants.

The CHAIRMAN. You said that when you discovered that something was wrong, it might have been either one of three things?

Mr. BONSTEEL. Yes, or even of more. I simply used those as illustrations.

The CHAIRMAN. You mentioned three things.

Mr. BONSTEEL. Fungous disease, seed, or something the matter with the soil.

The CHAIRMAN. Suppose it had been a fungous disease?

Mr. BONSTEEL. It would have passed entirely out of our hands.

The CHAIRMAN. Would you have been able to determine that that was what was the matter?

Mr. BONSTEEL. I think so. We should have submitted samples of that to some one, probably in the Bureau of Plant Industry, an expert in the plant diseases, in order to find out if that were not the trouble.

The CHAIRMAN. Who would have been more likely to have hit upon the remedy—a plant man, who is familiar with seeds and fungous diseases, or a soil man?

Mr. BONSTEEL. In this particular case—we are to take this as a general case or as a special one?

The CHAIRMAN. I was referring to a case of that kind.

Mr. BONSTEEL. In this particular case the general problem is somewhat known. There had been several investigations at that time. The plant investigators had failed to find any adequate reason why clover should not grow on those soils. We had that simply as a basis of information. In case we had not had that information, it would have been necessary to acquire it by submitting the case to the plant men as one of the steps in elimination.

The CHAIRMAN. Had anyone from your own Plant Bureau been investigating that particular problem?

Mr. BONSTEEL. I do not think so; I think that has been in the hands of experiment stations. I know in the State of Tennessee they have a kind of clover trouble which is undoubtedly due to the fungous disease, and there the plant physiologist of the station, Mr. Bain, has investigated that, has studied that condition out as a plant problem. It is an entirely different problem from the one in New York. Does that answer your question, Mr. Chairman?

The CHAIRMAN. Yes.

Mr. POLLARD. I want to ask you this question: In this concrete case that you have mentioned of these soils in New York, on which

you found you could not grow red clover, if they had quit growing red clover there for a period and put that soil into corn or wheat or oats or some other crop and left it in other crops for a period of five or six or seven years, or whatever period would be necessary, then could they have gone back and grown red clover without the putting of any lime or anything else like that on the soil?

Mr. BONSTEEL. That very thing was done in Tompkins County by a gentleman with whom I was well acquainted and who told me about it. He had found out some ten years before that it was impossible to raise red clover, and he had omitted that from his seeding, but accidentally a quantity of the red clover crept in after seven or eight years, and the red clover grew. That is simply a piece of experimental evidence which this man had accidentally given me in that case. That was one of the things that led to the conclusion that it was definitely a soil problem, because it lay right within the line of our experiences.

Mr. COOK. In this particular county you referred to where they could not grow red clover, after you disseminate instructions as to how those farmers should cultivate clover, are they successful in raising a crop?

Mr. BONSTEEL. We are going into the next stage of that process now, the disseminating of the knowledge thoroughly, and that is what they are requiring of us; and we are going a step further; that is, demonstrating beyond any question of doubt that under certain conditions—that is, careful liming of the soil—red clover will grow.

Mr. POLLARD. Before you leave that, would you mind telling the committee what you are doing in the way of demonstrating?

Mr. BONSTEEL. Yes, sir. The conditions were such in southern Cayuga County, N. Y., and in southern Tompkins County, N. Y., that the farmers were actually leaving their farms for various reasons, not this one alone, and there are stretches of land that are not occupied for agricultural purposes to any extent at the present time. There are, adjoining some of these, stretches of agricultural land where farmers are holding on and still fighting an uphill fight against this clover sickness and certain other troubles which they have there. There are other sections where they are still prosperous. We have gone into that district and found in southern Tompkins County 28 men who are willing to take up the cultivation of some 2 or 3 acres of their land under the direction of our Bureau of Soils. We will simply tell them what to do with that particular soil to bring it back into crop producing condition. The same is true in southern Cayuga County, where we have some 27 or 28 men who are going to follow the directions of the Bureau of Soils, utterly and absolutely, on this small area of their own farms, until they themselves are convinced that we have given the answer to this soil problem and until their neighbors are also convinced that we have the answer. These men would cultivate that land somehow and secure a crop, possibly with good results, possibly with no results. They would go through all the methods of plowing, of tillage, of seeding, of caring for the crop, that are known to the best agriculture at the present time. So that all we want is to step in and say: "Plough in the fall and not in the spring. Leave this ground rough in the fall and harrow it in the spring; apply lime before you seed to clover."

Mr. GILHAMS. Tell them how much liming to do?

Mr. BONSTEEL. Yes, sir. We need, in that case, to make a personal examination of each individual field before we can say definitely how much lime should be used. That is, a field which is in very bad condition would need a larger quantity; one which is in thoroughly good condition, as our expert would judge it, would only need to use a very small amount. So that the quantities used will be from 1,200 to 1,800 pounds of lime per acre, and this will need to be applied once in five years. We say to apply this lime in the spring and thoroughly harrow it into the soil and not to seed down for at least two weeks after the lime is harrowed in; otherwise there will be a practical difficulty coming in there, the danger of spoiling the germinating property of the seed by the gradual slacking of the lime within a few inches of the surface; we tell them that if they apply this lime and thoroughly harrow it into the soil we are certain that they will get a good stand of clover. In some cases these men are not satisfied with simply that amount of information. They may or may not want to raise oats the next year. They may have a tract of land which it is not possible to treat in this way from the beginning, but that same treatment must be used in order to make later treatment effective. In other words, if we come to a field which is covered with poverty grass, as they call it up there, which turns down so close to the ground that you can not turn it up with a high wind, or where it is covered with golden rod or daisies or some of those weeds, it is going to be necessary to eradicate those first. So the proposition would be to plow this land, sow it to buckwheat—they know all this, we simply have to indicate it to them—then plant it to potatoes, then you are ready for the treatment of the lime and the clover seeding.

Mr. POLLARD. When you make this application of lime, of course, I understand from what you say that you make an examination of the soil and determine how much lime is necessary to neutralize the soil. Will one application of lime neutralize these poisonous substances, this excretion from the clover which makes it poisonous, so that from that time on the soil is free from that infection?

Mr. BONSTEEL. I should like to say that in 90 per cent of the cases, let us say, it would be effective, it would be effective at that time. I would advise the application of a smaller amount of lime at the next time in the rotation, when the clover is to be seeded in. In other words, it would not be eternally effective, because those things do not last forever. They would have to repeat themselves in the due process of rotation.

Mr. COCKS. Do you ever find this condition on limestone soil?

Mr. BONSTEEL. Yes, sir.

Mr. COCKS. How do you figure that out?

Mr. BONSTEEL. A limestone soil might contain far less lime than soils derived from the decomposition of some other rocks. The limestone soil is frequently formed by a dissolving out of calcium carbonate, and it is formed by the other elements being accumulated while the lime is carried away.

Mr. COCKS. Have you ever tried the nitrogen inoculation?

Mr. BONSTEEL. I have not had occasion to use it personally, because throughout that general region the inoculation will ordinarily come for red clover spontaneously. For alfalfa, however, inoculation is required throughout that section of the State, and is usually accomplished by taking the partially dried earth from another alfalfa field,

spreading it over the new field, and disseminating those little nodules all through the dirt.

Mr. COLE. About this particular section of New York, where red clover does not grow, just one question. Why is it that they have not rotated crops up there during all these years?

Mr. BONSTEEL. In the case of the best farmers they have rotated crops. That is, their regular rotation has been corn, oats, seeding to mixed grasses, where they could get it, and then they have run anywhere from two to five or six years to timothy hay, and have endeavored to work their land on the basis of selling off hay and oats, which I would like to comment on as being very poor agricultural practice.

Mr. COLE. Yes, that is poor agricultural practice. Is it generally known by the farmers of the State that the Agricultural Department can cure sick soil?

Mr. BONSTEEL. I do not think so.

Mr. COLE. And will you have the forces and facilities to meet this demand when it is known?

Mr. BONSTEEL. It is known through a number of sections where our work has been introduced, but I would not say that it is known generally throughout the United States.

The CHAIRMAN. You would not say that it is generally known?

Mr. BONSTEEL. No, it would be like a practicing physician; he would find some cases too hard for him, just as we would find some problems possibly very difficult for us to handle.

The CHAIRMAN. What you do is to treat the simple ones?

Mr. BONSTEEL. We reach a more immediate success in treating simple ones. I think we would be liable to be criticised very severely if we tried to treat some of the other cases which were more complicated, and where we would be uncertain of the results. I think we would be very justly criticised if we would undertake to cure some of the cases I might cite. These, of course, are some of the examples only. It is the bringing together of the particular classes of information which the soil survey gives, and the bringing together of the particular classes and the solution of problems which we can depend upon the laboratories for, and applying them to a definite agricultural problem, that is taking soil science and making it soil art.

The CHAIRMAN. Do you ever call upon any of the members of the Bureau of Plant Industry to cooperate with you in any of your demonstrations?

Mr. BONSTEEL. In this particular case which I have mentioned, in New York State, it is my purpose when this matter has passed the soil stage to turn over the remainder of the problem, a great agricultural problem there, entirely to Mr. Spillman of the division of farm management of the Bureau of Plant Industry.

The CHAIRMAN. Does the Bureau of Plant Industry occasionally call in some men from your Bureau?

Mr. BONSTEEL. It does, very frequently. The Bureau of Plant Industry, I might say, has had the services of one of our experts, Mr. Mackie, working on the viticultural soils of California, another problem which we are studying. They have joined, through Mr. Hussmann, of the Bureau of Plant Industry, not only in the studying of the question of producing crops from these soils, but also bringing out the effect of soil on certain fungous diseases which attack grapes,

the coloring of the grape and its qualities when sold as a table or a wine grape.

The CHAIRMAN. When the problem confronts the Department of Agriculture, let us say, of restoring fertility or bringing again a series of good crops to an area that has lost the ability to produce them, what proportion of that problem would you say would be a plant problem and what proportion a soil problem?

Mr. BONSTEEL. I do not think that I could predict, simply from the fact that it would vary so widely with the particular case. This case of clover sickness, which I have mentioned, in New York, would be almost absolutely a soil problem; the case of the clover sickness in Tennessee, although it has a soil bearing, would be almost entirely a plant-industry problem, and it would be necessary to take up almost every particular problem. I do not think I could give you a general answer.

The CHAIRMAN. Would the trained and expert agriculturists who are in Mr. Spillman's division be wise enough to know whether a given problem was a soil problem or a plant problem, would they know when to call in assistance from the Soil Bureau?

Mr. BONSTEEL. In the case of some of the gentlemen whom I know personally in Mr. Spillman's division, I think I would say unhesitatingly, yes; in the case of some others I would be unable to state, because I do not know the gentlemen personally.

The CHAIRMAN. You may not care to answer this, because it is a question of policy upon which you might not care to commit yourself. But in order to get it into the record right here, I will simply say that what I have in my mind is this: That we already have established in the Bureau of Plant Industry, in the division of farm management, practically a division for demonstration work upon the farms of the country, to carry to the farmers the information that the research of the scientist has brought out here. We have such a division as that in the Bureau of Soils, because the work that you have been doing is just beginning and you are just now asking authority to do it. Those two things being true, the question in my mind is whether we would not better leave that demonstration work with the division which is already organized to carry it forward, simply with the understanding that they will call upon the Bureau of Soils for cooperation when they find they need a soil physician. As, I say, if you do not care to comment upon that, I shall not ask it.

Mr. BONSTEEL. There would be only one thing that would make me hesitate. Mr. Spillman is not present, and I should need to quote conversations between Mr. Spillman and myself, of which I only have my memory as evidence as to that particular matter. In other words, Mr. Spillman and I have talked just exactly this problem over together and gone far beyond that to the question of cooperation between my own division and his division. I would like to say this as a general statement: I do not think it would be possible for Mr. Spillman's men, who are trained as agronomists—that is, as students of agriculture in the broad sense—to handle soil problems in specific cases; and, as I understand it, the division between those two lines of work, while it might not be apparent on the surface, is very clearly marked. Take, for example, the case of one of the demonstration farms which he has in Alabama, and from which I know he is taking certain soil facts well known to me, the fact that alfalfa will grow upon a given type of soil—purely a soil fact. He is not investigating

the question as to the extent of the soil type, the method of preparation which should be used to put in alfalfa on that soil type, or the question of fertilizing alfalfa on that soil type; but what he is bringing to the farmers of Alabama is that, having a soil which will grow alfalfa, you can do thus and so with the alfalfa when it is grown; you can feed it to hogs and sit on the top rail of the fence and watch them harvest it and solve your labor problem and your meat problem and other problems.

Let us take another case. Just over the line in the State of Mississippi those same soils have been shown to exist, all through northeastern Mississippi. A few individual farmers have tried alfalfa, and some have been successful. My function there would be to say to these men: "You have an alfalfa soil on your farm, because we have mapped these soils and studied them and compared them, and we know what they are. Taking this particular soil, there are certain methods of soil treatment, a time to plow, a method of plowing, a depth to plow; certain methods of seeding that alfalfa, which have to do with the type of soil on which it is raised, not on anything else, and you can raise alfalfa." My problem stops right there. What you are going to do with it when you get it raised I do not care. You can sell it for \$15 a ton or use it for bedding or feed it to hogs; that is a farm-management problem.

The CHAIRMAN. If, as you say, a trained agronomist is unable to take a soil survey and get the best results from it, it emphasizes what was said here yesterday, does it not, that the average farmer can not take this survey and get anything out of it?

Mr. BONSTEEL. I would not care to comment on the observation particularly, but I would simply say this: If the trained agronomist will take the time to make the study of the soil surveys which I have to make and which my associates have to make and which the men who are working under me have to make, he would probably be able to make a large number of soil conclusions; but, not being a man trained along those lines, there would be the danger that some of them were inaccurate and the danger that he would jump to conclusions which would not be justified by the work under those circumstances; and, moreover, he is usually so thoroughly occupied with the line of work that is given into his charge that the best he can do is to ask me the question direct by letter when he wants to get that soil information. Now, the actual farmer himself is neither a soil man nor an agronomist nor a farm-management man, nor anything else like that; he is a man who is trying to make a living out of the soil, and if he can get hold of a piece of information or a bulletin dealing with a plant question he wants that; if he can get hold of information out of another bulletin dealing with the soil question he wants that.

My entire idea—the fundamental idea in my division—is simply this: I do not care what college experiment station or bureau in the Department of Agriculture is publishing bulletins for distribution. They are not reaching the farmers of the United States except in the very few cases. We can all of us admit that and be sorry for it. But the men whom I have are living human agricultural bulletins who come around and jog a man's elbow, and if he has read a thing in a bulletin and he says it is so and throws the bulletin in the fire, this man comes and says, "Here, I see you can not raise red clover in the soil, and I will tell you why." It will occur to that farmer

that he has read something like that and he will ask the man for the bulletin, and after he gets it the second time he will use it. That is not a question of the value of the bulletin; it is simply a question of the human equation, the individual influence.

The CHAIRMAN. Yesterday Mr. Whitney showed us a map of a survey by himself, by which he had determined that certain soil in Mississippi was good truck-gardening soil.

Mr. BONSTEEL. Yes, sir.

The CHAIRMAN. The question occurred to me why, when he reached that conclusion and made that survey, he could not somehow have turned it over to the farm-management people and said, "There is an opportunity for you to teach those people how to utilize their land; that is good truck-gardening land; now, go ahead and use it in that way." But I judge from what you say that it would not have been safe to have turned it over to them in that way.

Mr. BONSTEEL. I may say to the committee that I made that survey in 1901 and that bulletin has been in existence from that time to the present. It has not created a large amount of interest in Mississippi; it has created some with the individual who is interested in trucking, but it has not created a large interest, because they are satisfied with growing their cotton.

Mr. POLLARD. Has the farm-management bureau presented the matter to the people?

Mr. BONSTEEL. I should say no; not to individuals. Mr. W. W. Tracy has taken up that matter with individuals down there merely as a matter of private interest. This, I think, has been carrying the concrete example about as far as we need to. That is what they are: Merely questions in regard to the relationship of my own work with the other bureaus.

Mr. LEVER. Will you tell the committee what you are doing with respect to fertilizers?

Mr. BONSTEEL. That work is one of the very interesting things that we are beginning to try to work out. We have found, simply by compilation of the brands of fertilizers now on the market, that within the cotton-growing States there are some twenty-three hundred different brands of fertilizers which could be readily classified into about four different kinds of fertilizers. Our field men of the Soil Survey have observed certain general empirical facts in regard to fertilizers, and we could say, without very much chance for question, that in the production of cotton upon certain of the soils of those Southern States which are marked by very gray or brown surface—sandy soil to a depth of 6 or 8 inches, this being underlain by a deep red sandy clay subsoil—that the farmer can largely omit the potash salts from his fertilizers and be relieved of the responsibility of buying a fertilizer rich in potash salts. That is an empirical observation so far.

I would like to have my colleagues in the laboratory through investigation and study of the work tell me the reason why, provided that can be brought out—in order that we can possibly secure cheaper fertilizers than we ever had before on those soils—some man may have on one portion of his farm some of the sandy soils underlain by the heavy, massive yellow clay subsoil common to one portion of the South Atlantic and Gulf States; if that man were asking me for advice in the use of fertilizers I should tell him to use a commercial fertilizer having a moderate amount of potash salts in the fertilizer. That is again empirical. If, on the other hand, down

in his bottom lands he had a surface soil that was dark and mucky and extended down to 12 or 14 inches, I should tell that man—and this is again empirical—to use a large amount of potash salts, and in cotton production use the muriate. That is largely empirical at the present time. In just what manner that lines up with Mr. Schreiner's work on toxic bodies I do not now know. I presume he can find out, if he is given the opportunity, many more problems of that kind, but those are some of the problems which we can solve for the practical farmer, and it means dollars in his pockets; it means comfort and satisfaction, which are worth more than dollars to him. Those are some of the things which we are solving down there throughout this South Atlantic and Gulf States section.

There is one other line of work there I have not taken up at all yet, and I would like to speak on if we have the time this afternoon. That is the broad study of the kind of crop to raise on each particular soil. We have spoken of some 460 absolutely distinct types of soil in the United States, as distinct as human individuals. We only have about 12 great staple crops in the United States, some of them suited to one soil, some suited to another. We have been able to work out not from any single soil survey, not from any single group of soil surveys, but from eight years of patient work we have been able to work out one fundamental fact, with the kind of soil that you have fixed, the variety of crop you wish to raise is determined. We do not try to answer this particular question, What is a corn soil, or what is a wheat soil, or what is a tobacco soil? But I do want to answer the questions, On what variety of soil shall I raise Toole cotton? On what variety of soil shall I raise Mosby's prolific corn? On what type of soil shall I raise Baldwin apples? And so on down the line. The law that enables us to answer those kinds of questions is, to my mind, worth the work that we have done here, simply from a practical farm standpoint.

Take the case I have had to deal with in December in New York State. A general complaint went up from all over the State that they were unable to mature corn. I know it to be a fact that they are endeavoring to bring into certain localities corn which was raised under the climatic and soil conditions of Illinois, Wisconsin, Iowa, Missouri, and Kansas, trying to bring that seed, without any process of acclimatization, to New York, and plant it in the soils which do not exist in any of the States where that seed was developed. They have necessarily failed in a great many cases. Now, the great question that comes up there, and it follows the law—and it is a thing that goes right over into the plant breeder's hands, although the soil man needs to work out the law—is this: How can they develop in New York State the corn which is suited to their soils and their climates? We establish the distinction between the plant and the soil problem. We can help them so far. And another question comes in, which is purely a question of advice. Having a given type of soil in New York State and wishing to plant corn, what is the variety of corn suited to that soil? It is a practical question and a soil question. In all cases I can not answer. Maybe I can answer if we have an opportunity to investigate that matter. We will find out, just as one of our men who is here present, Mr. Wilder, has been investigating the adaptation of varieties of apples to types of soils down through the Appalachian Range, from the Hudson River in New York to northern Alabama.

If I were to try to go into the technicalities of this matter, I should get tangled up, because I could not tell you in a few minutes what it has taken Mr. Wilder all summer to find out. But I could tell you this: We have a general region which might include New England, New York, and northern Pennsylvania, within which certain varieties of apples can grow, partly a soil fact and partly a climatic fact. Within that general region we will have a variety of soil types. Upon some one of these the Baldwin apple will grow to perfection. Under the same climatic conditions, possibly on the same farm, will be another soil type where the Baldwin will produce little, gnarly fruit about once in three years, and is not a commercial proposition. But some other apple, like the Spitzenburg or the Rhode Island Greening or some one of those others will grow to advantage on that soil. If a farmer has a soil map in his possession, showing the boundary between those two soil types, it will tell him where to plant one or the other variety, provided he knows the fundamental facts. If he does not, that must be pointed out to him, and one of the pieces of work which I hope to have Mr. Wilder do is to have him treat with horticultural societies and with groups of persons interested in apple culture in regard to the question of the soil on which they must plant each definite variety of apple.

I would like to give you a little historical instance here of a case that called this strongly to our attention. A gentleman from West Virginia was brought into our office by a member of the Bureau of Plant Industry force. He had planted peaches on a considerable tract of land in West Virginia and Maryland. Some of those peaches had thriven and brought forth harvests that were making the man rich. Other peach trees had absolutely refused to produce fruit, although they grew beautifully as ornamental shade trees. The Bureau of Plant Industry had eliminated everything that had to do with the plant, and having eliminated those had brought the man to us to find out what the soil problem was. I asked the man what the character of his original growth was on those lands which he had been clearing and of which he proposed to clear 2,500 acres more the next spring. He said that where his peaches succeeded he had had an original growth of chestnut and certain other undergrowth which he mentioned. Where his peaches failed he had had an original growth of white oak and certain other associated classes of undergrowth. I knew something of those soils, not from studying that particular region, but from soil surveys made in Pennsylvania, where they had the same soils and the same natural growth. I said, "Yes; this growth was on the sides of your mountain slopes, was it not?" Answer, "Yes." I said, "It was filled with sandstone fragments?" He said, "Yes." I said, "It was well drained?" He answered, "Yes." I said, "It did not have any hardpan under it?" He answered, "No." I said, "Your soil on which your peaches failed lay on the top of the ridge of your mountain, and it had under there, at a depth of not more than 10 or 12 inches, a heavy clay or clay loam subsoil?" He answered, "Yes."

I had described to him a soil known to us in that general region, but not known to us on that particular farm, and the question then was to send Mr. Wilder to that place and have him point out on this new land which was to be cleared that portion which was suited to peaches and that portion which was not, in a region where no map—no soil-survey map—existed. There is, then, a question of the adaptation, not of apples, or of peaches, or of corn, or of rice, to soils, but the

question of what variety of apple or peach shall we plant; the question, what variety of corn; the question, what variety of cotton shall we plant on each particular soil, and it is a soil problem, and I think that you will agree that I have shown that. I could multiply those instances endlessly and tire your patience here, but I do not think that it is necessary to go ahead and do so.

There are other lines. The question has been brought up in regard to the settlement of new lands in the United States. In some of these areas which are being settled are soils which have never been brought under agricultural dominion since the beginning of the history of this country. Some of those soils are like soils in the old existing States. Some of those soils are totally different from anything that exists under cultivation anywhere in the United States at the present time. We know that from hasty reconnaissances, from incidental observations. Now, in the case of the settlement of new land, whether it be in the cut-over pine land of Michigan or of Wisconsin or of Minnesota, or whether it be on the great plains of Kansas or Nebraska, or the Panhandle of Texas, wherever it may be, if we can carry into that region the information which has been derived by years of careful work and by years of loss, in many cases, on similar soils elsewhere, I believe that we would render a service to the individuals there, and to the States and to the nation, that can scarcely be estimated in dollars. That is another problem, the question of finding what these unoccupied areas of the United States are suited to produce, and what method of soil treatment should be used to make them fertile, food-producing lands. It astonished me, gentlemen, when I found out that less than one-half of the total area of the United States was occupied by farms and that of that which is actually in farms less than one-half, again, is classed even as improved land, to say nothing about crop area. We are standing just at the threshold of soil knowledge and of the utilization of our soil resources here in the United States, and the problems which confront the men on the new land are different from the problems which confronted the men on the old, established seaboard States, and each has his own problem and each one is very important, and they are very necessary soil problems. It is a national question; it is a question that has no reference to State boundaries. These problems which I have quoted here in New York State I could have quoted with equal truth from Pennsylvania or northeastern Ohio. The problem of fruit culture, which I have quoted from West Virginia and from Maryland, I could quote all the way from Aroostook County, Me., to the lower end of the Appalachians in northern Alabama, or I could have quoted similar problems, not identical, in the fruit regions of Missouri, Oklahoma, and Arkansas, or, again, in Tennessee and in Kentucky. Soils do not know any State boundaries. The soils were there first, the State boundaries were run afterwards. The problem is national and is the basis of our agricultural wealth.

I would like to submit, if I am not tiring the committee too much, simply a list of some of the more prominent problems which ought to be taken up by this division of soil utilization. This is a practical division, which takes the scientific knowledge of the soil derived by research and brings it down to the farmer. First of all, in the utilization of lands which are not now agricultural, I should like to mention the big problem that we have in the cut-over pine lands of Michigan, Wisconsin, and Minnesota. We know of the existence

of that problem; whether that is purely a soil problem, whether it may be eventually turned over to more than one bureau of the Department, I do not know at the present time. The soil survey will help to settle that. Then, the same can be said, that we need to study the cut-over pine lands of the Gulf States—lands which were proclaimed as lately as ten years ago to be absolutely worthless for agriculture and which are now producing a bale of long-staple cotton to the acre.

The CHAIRMAN. Was that change brought about by the soil survey?

Mr. BONSTEEL. It probably was not. The soil surveys have helped by taking hold of the accidental case where some man has been able to establish that long-staple cotton. He has established it on a given type of soil, and we can now state with considerable definiteness where, throughout that region, any other man can do the same thing. That is, the original discovery is perhaps due to some man who had calluses on his hands and walked between the plow handles, but we want to utilize his knowledge for the spread of useful things in regard to those soils, no matter if the knowledge did come from a man who had to walk between the handles of his plow.

Mr. BEALL. What is an acre of that land worth?

Mr. BONSTEEL. It would depend altogether on the locality. In some localities the land would sell for from \$5 to \$10 an acre. Within 25 miles of that, nearer to railroad transportation, nearer to banks, nearer to churches, land will bring from \$25 to \$30, but there is a good deal that could be bought for from \$5 to \$10 an acre.

Mr. BEALL. A bale of that (Florodora) cotton would bring \$100, would it not?

Mr. BONSTEEL. I have a case of a man who had 12 acres in Florodora cotton, and after he had harvested his crop the sale of that cotton ranged from 18 to 30 cents a pound; so that that man certainly got more than \$100 an acre from his land. But his neighbors, right across the road, some of them were doing the same thing, but some of them were not. They were not learning why. They simply thought he had good luck.

Then we have these swamp lands. There are vast stretches of it. Some of it is good agricultural land and some of it is not, and you can not tell from the surface which is precisely which. As a general proposition you could not state what that swamp land was. When you have the dark-colored surface soils extending down to a depth of 6 or 8 inches, and underlain by a loam or clay soil, you have a fertile soil, and one that will last. But when you have it underlain by coarse, white, sharp sand, you have a soil which, about two or three years after clearing, will be no good. You can not get any more out of that soil without expensive treatment. There might, possibly, be cases where we might stop the actual soil exhaustion. The same problem comes in the utilization of cut-over lands in the Puget Sound region, where some of the towns and the villages are actually hiring stump pullers to go out and clear land so that it can be actually occupied for fruit and vegetable cultivation.

This will give a beautiful illustration of the point raised awhile ago. That problem was called to my attention by Mr. Spillmann.

Now, the extension of crops already grown on soil types, which we have studied in the United States, would constitute my second grand division, the extension of alfalfa culture in the black prairie regions of the South, to which I have already referred, through to northern Texas.

In the vicinity of Sherman the alfalfa has practically driven cotton and corn off the black waxy lands, because it yields greater profits per acre with less labor in the production. Lands of that kind exist elsewhere in Texas, equally well suited for the production of alfalfa, where hay prices run from \$18 to \$35 per ton. I believe that it is desirable, from the cotton planters' standpoint, to produce as much alfalfa as can be profitably produced on those lands. These lands exist in northeastern Mississippi, and in central Alabama alfalfa is beginning to get a foothold, but a great many of the planters down there lack the determination to make a trial of a new crop. A little assistance, a little standing behind their elbows, will help them to extend that alfalfa culture where it is badly needed in a nonhay-producing region.

The same might be said of the extension of the alfalfa on certain soils in New York State. At a very small expenditure it would be possible for one of our men to show beyond a doubt, a section of the country extending from eastern New York west nearly to Buffalo, over which we can say with certainty that alfalfa can be produced. We have produced quantities of timothy hay, quantities of oats, quantities of corn, but we do not produce leguminous crops to satisfaction. I speak feelingly, because I need alfalfa hay in my business. I could extend the alfalfa production over an area of 100 square miles in New York at a small expenditure in the utilization of the best soils to which it is adapted. In the same way there exist in northern Ohio, Pennsylvania, and New York a series of soils suitable to the production of grapes. We have studied those soils in Tompkins County and Chenango County. I know from personal reconnaissance, from knowledge of the country, that these soils extend from about Put-in Bay, Ohio, to the lake region in New York, and even down toward the Genesee Valley, where some Italians have started to produce grapes on those soils.

It has been valiantly proclaimed by horticulturists and others that grapes can only be produced when they are in the vicinity of some large-sized body of water. Yet these Italians have proven that that is not true, that the grapes can be produced on these soils when there is no large body of water immediately in the vicinity. Then there is the extension of the apple and peach orcharding throughout the Appalachian section. I have already referred to that. That problem touches Alabama, it touches western South Carolina, North Carolina, Virginia, Maryland; it touches all of Pennsylvania, practically all of southern and eastern New York, and it also touches West Virginia, Kentucky, and Tennessee. That is, throughout this region there are lands too rough to be used for ordinary agriculture; it must be occupied by trees of some kind, and in many cases the apple tree is going to be the best tree.

Then there is the extension of the truck and marketing gardening industry along the Atlantic seaboard. We have found out by several surveys in that section some very interesting facts. I may take the fact that sweet potatoes, for instance, grow to the best advantage on a coarse, sandy soil, in New Jersey. When we carry that over into Delaware we shall find the same soil type producing the same quality of sweet potatoes. The same way in the Norfolk area, although there we come across a curious proposition in that we find that the sandy soil is much finer than that in the northern belts. Although the same sandy soil produces sweet potatoes to great advantage, we have

developed there another law, that in the northern extension of this trucking belt coarser sand must be used for sweet potato production, and as you go further south you run across the finer sands. No single soil survey would develop that law, and no single soil bulletin can carry that information.

The CHAIRMAN. The people found that out long ago, did they not?

Mr. BONSTEEL. In limited areas. The area around Norfolk, for instance, which is devoted to trucking, at the present time only constitutes a small portion of the soil survey there. There are soils which should be developed for truck production throughout the Albemarle Sound region, in North Carolina, where they have the same soils, practically the same climate, and similar transportation conditions to those at Norfolk. They are engaged in a large portion of eastern North Carolina in producing cotton, tobacco, and some corn. They do not know of the possibility of potato and truck growing.

Mr. LAMB. You know, of course, that the finest sweet potatoes grow right around Cold Harbor?

Mr. BONSTEEL. Yes, sir; some of those are far better than those along the Atlantic coast. The northern trade has gotten used to the red sweet potato, so that they do not take as kindly to some of those. Yes, sir; Cold Harbor possesses some of these soils.

Mr. COOK. Speaking about sweet potatoes, of course you know what we raise in my State, Colorado, in the way of Irish potatoes?

Mr. BONSTEEL. Yes, sir.

Mr. COOK. Which, I believe, are the best in the world. We can not raise a good sweet potato in Colorado. Why?

Mr. BONSTEEL. I should not be able to answer that question off-hand. I should presume, however, there were some climatic difficulty in the way. It would not be a soil difficulty. Then we have another great industry; that is, the industry of growing tobacco. Some of the earliest work of this Bureau of Soils was in the identification of soils suited to producing the different varieties of tobacco, and that work has led on to the study of the great staple crops and the development of laws which were found to hold good in the case of tobacco and were suspected in the case of other crops. For instance, we find that a tobacco expert can tell, with a great degree of certainty, whether a particular brand of tobacco was raised on a sandy soil or a clay soil, and you can not fool him, because he knows by the texture of the leaf, he knows by the color of the leaf, he knows by the quality of the variety in the aroma. There is a plant problem which can not be solved without the assistance of the soil man.

We have the necessity for the extension of rice culture, not only in Texas and Louisiana, where they are already raising rice and know a great deal about it, and where we are finding out about it, but also in Arkansas, northern Louisiana, and northern Mississippi, where there are extensive areas of land, such as down on the Yazoo Delta, which are producing nothing but sweet gum and which might be used in developing rice.

Mr. BEALL. Did the Department have anything to do with the introduction of rice in Louisiana and Texas?

Mr. BONSTEEL. The Department of Agriculture?

Mr. BEALL. Yes.

Mr. BONSTEEL. The pioneer work there was done, I believe, by individuals, who simply apply or use the farm machinery, power machinery, in the production of rice, instead of raising the upland

or Providence rice. That was followed up by the Bureau of Plant Industry by securing seed from Japanese sources which would resist the milling processes of the improved machinery.

The CHAIRMAN. I was told by a gentleman who has had a great deal to do with the development of the rice industry in Louisiana and Texas that the Bureau of Soils made a survey in that region and indicated certain land as land upon which it would not be worth while to raise rice. But, notwithstanding this advice, he sowed the land to rice and got the best crop out of that particular area that he had had in that particular vicinity. Do you know anything about that?

Mr. BONSTEEL. I do not. I know that the Bureau indicated in the Lake Charles area those soils which were being successfully used for rice production at that time. If any of our men have made the statement that the soils could not be used for rice culture, he certainly exceeded his authority. In the same way I would limit my statement in regard to alfalfa in New York. I could indicate hundreds of square miles where I am definitely certain that alfalfa will grow, but I will not say that it could not be raised in the rest of New York.

Mr. COOK. Is there not danger of its freezing out?

Mr. BONSTEEL. Yes, there is danger of it freezing out. If alfalfa were planted upon a given soil type on a hill slope that was toward the prevailing wind there would be difficulty in keeping a snow cover to keep it from freezing out. Where, however, the alfalfa was on the other slope of the hill, there might be a possibility of raising alfalfa. I have already mentioned the great grape producing areas in the central valleys of California, where there are soil questions arising which touch not only the vineyardists directly, but also the man who is studying the quality of California fruit problems, who is studying the coloring of fancy table grapes or the extensive markets, and who is studying the question of the resistance to phylloxera and other diseases. We found out that not only are different varieties of grapes different in their resistance to phylloxera, but that these vines differ on different soil types, and we can name the soil types in some instances. We have there the question, not only of extending the area which can be planted safely to grapes, but also of picking the variety of grape which should go on the variety of soil in order to save a man from three to five years of work and several hundred dollars of expenditure in planting unfavorable soils to grapes. That work has been called for possibly more strongly than any other line of work which I have under my charge, with the possible exception of the work in the clover-sick section of southern New York.

The apple culturists and orchardists of Oregon, California, Washington, and Idaho are writing to this Bureau of Soils inquiring about new lands that may be cultivated to apples. A letter came to my desk the other day from a gentleman located at some point in Washington—I forget the exact place. He had land in Idaho, which consisted of volcanic ash soil, underlain with what he called limestone at a depth of about 3 feet. He suspected that he might have difficulty in planting apples on that subsoil, and he wanted to get our opinion on what he had better do. I was not able to inspect that land or to send a man to inspect it, but I knew from the soil surveys made in that general region about what he had. He had hard pan, and I answered his letter this way: "If irrigation water penetrates that subsoil freely and drains away, you will probably have little difficulty in establishing your apple orchard. On the other hand, if irrigation

water penetrates to that subsoil and remains there, or accumulates in the subsoil and in the surface soil, it will be fatal to your apples. In addition to that drainage problem you have also to look out for the question as to whether black alkali will come in and in a year or two ruin your soil." I then cited the instances of men in California and Oregon who had had experience with this hard pan problem and had solved it by simply digging a hole in the hard pan, putting in a charge of dynamite and shattering that subsoil in order to plant their crops and their orchards. That was a question which could probably have been answered by letter; I could have answered him definitely if I had inspected his field.

In many cases, possibly I should say in the majority of cases, it is not that the farmer does not know what to do provided he is told what is the matter, but the very first important step for him is the diagnosis of the case to find out what is the matter. Is it a soil problem or is it not? If it is a soil problem, which particular one? And it takes exactly this human agricultural bulletin who is the soil utilization man, to solve that part of the problem. It can not be done by a bulletin; it can not be done by writing; and those are the vital things that are coming up in my division day after day.

Mr. LEVER. Have you finished on that line?

Mr. BONSTEEL. I have.

Mr. LEVER. On page 31 of the estimates you have here in italics "to investigate and demonstrate the best methods for the utilization of the soil resources of the United States," and so on. You are familiar with that language?

Mr. BONSTEEL. With the italicised portion?

Mr. LEVER. Yes.

Mr. BONSTEEL. I have not had an opportunity to look over the Book of Estimates at all.

Mr. LEVER. I was about to ask you if you regarded that language as necessary to give you the authority to do your work?

Mr. BONSTEEL. I am not a lawyer or a jurist myself. I have always considered it sufficient to continue the work simply from the broad opening clause in the legal authority for the work of the Department, to investigate and disseminate knowledge.

Mr. LEVER. And as a matter of fact you are doing this kind of work?

Mr. BONSTEEL. As a matter of fact we are doing this kind of work.

Mr. LEVER. How long have you been doing it?

Mr. BONSTEEL. Incidentally to the rest of the work we have been doing it very nearly from the beginning of the soil work. When the tobacco investigation was under the Bureau of Soils, that work starting in 1900 in connection with the tobacco problem, having authority for that line of work, for the study of soils and their relation to organic life, and to climate, and also the general organic act which authorizes the Department of Agriculture to disseminate such information when it is secured, I had not troubled myself with the question as to whether or not any further authority was necessary.

The CHAIRMAN. How long has the soil utilization department been established?

Mr. BONSTEEL. The soil utilization, which is a combination of two of the older divisions, was established this last year.

The CHAIRMAN. How much money was given you for that work during the last fiscal year?

Mr. BONSTEEL. Mr. Whitney will probably be able to give that

and it is therefore not the creation of a new division except as it coordinates and regulates. The soil management work, which was engaged particularly in the study of fertilizer requirements of soils, and this new line of work, soil utilization, which is a little more comprehensive, taking in this question of the adaptation of crops to soil, has for the present year \$38,839. That covers two lines of work, another line of which I have not spoken specifically.

The CHAIRMAN. We learned in the beginning that there was appropriated for this year, Mr. Whitney, about \$88,000 for the making of new soil surveys. That would leave about \$90,000 in your lump fund, of which it has just been stated that \$38,000 is used for the soil utilization work. Can you give us in a word how the remainder of that \$90,000 (some \$52,000) has been spent?

Mr. WHITNEY. In the soil survey work for this year we have set aside an allotment of \$75,450. For the administration expenses we have \$49,084.

The CHAIRMAN. Does that or does it not include the statutory salaries?

Mr. WHITNEY. Oh, yes; this includes the statutory salaries. For the laboratories we have set aside \$22,535. For the soil management investigations and the soil utilization we have set aside \$38,839. For soil erosion we have set aside \$5,000. For soil fertility investigations we have set aside \$16,350, making a total of \$206,980.

Mr. POLLARD. Can you differentiate between the two divisions that were consolidated into one, and indicate the amount that has been spent for soil management and the amount that has been expended for soil utilization?

Mr. WHITNEY. I had that on a paper that has gone into the record. I find I have not got it here.

The CHAIRMAN. It will appear in the record?

Mr. WHITNEY. It will appear in the record. I have not taken up specifically the work of soil management or the work of soil erosion.

Mr. COOK. Approximately how many employees have you in your Bureau of Soils?

Mr. WHITNEY. We have about 120, as I recollect.

Mr. BEALL. That is, including the field parties?

Mr. WHITNEY. Including the field parties. Mr. Chairman, there are other lines of work that the Bureau of Soils is taking up or is engaged on, and there are other men that I would be glad to have the committee hear, but I feel that the work of the bureau has been very fully set forth, at least with sufficient detail to show the committee the character of the work for which demands are made, the character of the work we are doing, and the importance, the practical importance to the farmer, of investigations along these lines, and I am perfectly willing now to leave the welfare of the Bureau of Soils to the kind consideration of the committee, and rest the case here, unless the committee want further information, or want to hear from other members of the bureau's force.

The CHAIRMAN. I am quite sure the committee has been interested in what Mr. Whitney and the other gentlemen of his bureau have had to say, and if we had time we would like to hear more, but the days are "gliding swiftly by," and we still have a great deal of work to cover, and I rather suspect we will have to let ourselves be content with what we have heard.

At 4 o'clock p. m. the committee adjourned until to-morrow, Wednesday, January 29, 1908, at 10 o'clock a. m.

COMMITTEE ON AGRICULTURE,
HOUSE OF REPRESENTATIVES,
Wednesday, January 29, 1908.

The committee met at 10 o'clock a. m., Hon. Charles F. Scott (chairman) in the chair.

The CHAIRMAN. We have before us this morning the estimates for the Bureau of Entomology, and I have asked Doctor Howard, the chief of that bureau, to come before the committee and give us such information as the committee may desire and as he may wish to volunteer. I would suggest that he review first the general work of this bureau, and then we will ask him to consider a little more in detail, perhaps, the work that the bureau has been doing in the fight against the boll weevil and in preventing the spread of the gypsy and brown-tail moths in New England.

STATEMENT OF MR. L. O. HOWARD, CHIEF OF THE BUREAU OF
ENTOMOLOGY.

Mr. HOWARD. Mr. Chairman and members of the committee, I have placed on the table this morning a small pamphlet entitled the "Report of the Entomologist" for 1907. This pamphlet contains in condensed form the operations of the Bureau of Entomology for the past fiscal year, which will give you in a very brief way an idea of the activities of the bureau. I may say in a general way that we have two large projects on hand, one of which we have been engaged upon for seven or eight years and the other for three years. The first is the cotton boll weevil investigation and the second is the gypsy-moth investigation, both of which are appropriated for under the head of emergency appropriations at the end of the bill.

In the regular work of the bureau we have on hand three or four new investigations started under the direction of Congress last year; an investigation of the pear thrips in California, an investigation of the white fly in Florida, an investigation of insects affecting tobacco in the dark-tobacco belt of Kentucky and Tennessee, and an investigation of the grape-root worm in Pennsylvania. Outside of these investigations, specially ordered by Congress at its last session, we have certain regular work which goes on under a certain classification of the subjects. You give us each year a lump fund, a fund entitled "for entomological investigations." Last year it was \$113,000. That was an increase over the year before of something like \$38,000. This year, in the course of the regular growth of the work, the Secretary of Agriculture has asked for \$35,000 more, making approximately \$150,000 for the general work of the Bureau of Entomology. We classify our work under certain heads in order to facilitate operations. We have, for example, one man and a corps of assistants who are working on the problems of insects that damage our forest interests and our forest products. We have another man and corps of assistants who are handling the insects affecting deciduous fruits all over the country.

We have another corps of men and assistants handling insects affecting grain and forage crops, and another corps of men handling Southern field crops, and another corps of men handling insects affecting truck crops and stored grains, stored products, and so on. Then we have other branches of the work. We are doing what we

can to help the bee keepers of the country, doing work in apiculture. Then there is a corps of men and assistants conducting investigations concerning silk culture, doing what we can to help to establish a silk industry in the United States. Then there are other miscellaneous investigations that are carried on without any such direct subdivision. Almost each year there will come up a subject of economic entomological interest which is new to the country; some insect hitherto unknown as a pest will become abundant and injurious and will require immediate investigation. We have a reserve fund for investigations of that kind.

We are also carrying on a great many interesting and probably important investigations regarding the introduction of parasites into this country of pests which have been accidentally introduced into this country from abroad. That was hinted at yesterday morning in the instance of the gypsy and browntail moths, and we are bringing from abroad parasites of those insects. We are also bringing over parasites of other pests, among them of the codling moth. We are also undertaking investigations concerning insects affecting men and animals. It seems that to our bureau, which is the only branch of the Government service that is doing work with insects, all applications come from the Public Health and Marine Hospital Service, from the medical profession, from health officials, and from the Army and Navy, for information concerning the mosquitoes that carry disease, and the house fly in regard to its carriage of typhoid fever and other intestinal diseases, and the life history of the ticks that carry diseases of domestic animals, and we are therefore called upon to do a great deal of work in that direction, although at a comparatively light expense. This is a bird's-eye view of the activities of the bureau.

The CHAIRMAN. Will you review in a little greater detail the work you have undertaken this year by direction of the last appropriation bill, such as the investigation of the white fly in Florida, and the other three subjects you mentioned?

Mr. HOWARD. With pleasure. May I suggest that my principal assistant, Mr. Marlatt, has just come from Florida, where the work on the white fly is going on, and he can give you a clearer account of it than I can.

The CHAIRMAN. Very well; we will hear Mr. Marlatt.

STATEMENT OF MR. C. L. MARLATT.

Mr. MARLATT. Mr. Chairman and gentlemen, the white fly is an enemy of citrus fruits, and its range until this year has been Florida and the Gulf districts. The important citrus district of the south-east is Florida, and the white fly is the great pest of the orange in Florida. It has been present there for many years, but the evidence seems to indicate that it is an introduced pest from Asia. It breeds very rapidly and covers the trees absolutely. I have some specimens in a box here which show the abundance of the insect. The trees are covered in a few weeks, and the insect not only extracts from the tree the vital juices, the sap in other words, but it secretes a honeydew in which grows a black fungus. The latter eventually covers the whole tree, and blackens the leaves and fruit so as to make the latter unsalable, or necessitates washing before it can be

sold. The value of the crop is reduced at least 50 per cent in Florida by this pest.

Mr. LEVER. This insect does not attack the fruit itself, but the tree?

Mr. MARLATT. It confines itself to the leaves of the tree. It does not attack the fruit. The uncertain condition of orange culture in Florida, due to danger of frost, has prevented the growers in the State from taking very vigorous hold of this white fly problem, and it has been allowed to drift along for several years. Two years ago your Congress started work on the white fly through our bureau. This is the second year of that work. There are three means of control of the white fly, first by direct applications, spraying or fumigation, to kill the insects, second by encouraging certain parasitic fungous diseases which develop under the climatic conditions in Florida very freely, and, third, by the introduction of parasitic insects.

The fungus diseases offer one of the best hopes for control. You will find for example the leaves in this box covered with little yellow, brown, or orange spots. Each one of these brown, yellow, or orange spots is a white fly, parasitized by a fungus disease. This leaf you can see is almost yellow from the fungus. There are perhaps several hundred fungus pustules on the leaf.

The CHAIRMAN. Is the fungus itself harmful to the tree?

Mr. MARLATT. Not at all. It is purely parasitic on the insect. There are three of these useful fungi, commonly called the red, the brown, and the yellow fungi—all illustrated in the exhibit—and all important means of control of the white fly.

Another means of control is by parasites. Unfortunately we have found no parasite attacking the white fly in Florida. It seems to be without natural enemies of that sort. The related insects in the other parts of the world are attacked by parasites, and one of the problems we have under way is the introduction of these parasites from other regions, with the hope that they will take hold of the white fly in Florida.

These fungus diseases are effective to the extent that they clean the groves once in three years in the regions where they do their best work. No natural control of this kind can be effective every year. There is a necessary balance. The fungus gets the lead and exterminates the white fly or brings it into considerable check for a while, and then the food supply for the fungus disappears and the white fly comes up again. In Florida these fungi clean up the white fly once in three years. In other words, they give an average of one-third protection annually.

Mr. COCKS. They do not live on anything else but the white fly, then?

Mr. MARLATT. They are limited to the white fly, so far as we know. They would not attack anything else but other insects.

Mr. HAWLEY. How large is the white fly?

Mr. MARLATT. It is a little larger than the head of a pin, about the size of those fungous spots you saw on the leaf.

Mr. HAWLEY. Does this fungus feed on nothing else but the white fly?

Mr. MARLATT. No, sir; these fungi have not been found on anything but the white fly, but allied fungous diseases attack other scale insects.

The work in Florida has been under way for two years, and in that time we have worked out thoroughly the life history of the fly, and there is now a publication in preparation giving all the necessary facts concerning it. We have made a great many experiments with these fungi to find the best means of artificially distributing them. One method is to collect several bushels of infected leaves and make a water mixture of them and spray this on the trees. In groves where the fungus does not occur we can accelerate its action by this means. We are carrying on a series of experiments to determine the best means of hastening the action of the fungi and introducing them into groves where they do not occur.

The CHAIRMAN. The fungus itself is a vegetable growth?

Mr. MARLATT. Yes; it is a vegetable organism. You will find that practically every one of those insects in the case of these leaves exhibited has been killed by those fungi.

The CHAIRMAN. At what stage in its life history is the insect shown here in this box?

Mr. MARLATT. In the next to the last stage, what we call the pupal stage, or the nymphal stage. It transforms from that stage into a little white fly one-eighth of an inch long.

The CHAIRMAN. So that the fungus takes it in the pupal stage?

Mr. MARLATT. Yes. There is no enemy known for it in the adult stage.

The CHAIRMAN. To what extent have you been successful in artificially propagating the fungus?

Mr. MARLATT. We have found that it can be propagated by spraying with the water mixture described, and by the simpler process of collecting a lot of fungus covered leaves and pinning them to leaves around a tree. The spores of the fungus float off in the air, and the tree in two or three months will become covered with the fungus, and the white fly will become pretty well cleaned up.

The CHAIRMAN. What have you to say as to the results of that work? Do you think that problem has been pretty well completed?

Mr. MARLATT. The matter of the fungus is still under study. These are preliminary experiments. They should be repeated and carried on on a larger scale. The work with the fungus should be completed in a year or two more. There is nothing in the problem that necessitates long continued experimentation. In fact there is nothing in the white fly problem that should run over a long period of years.

The CHAIRMAN. That is what I want to get at. I notice you omit from the bill this year the language by which you were especially directed last year to attack this problem. I wondered if it was because you had completed it, or because you thought special instruction was no longer necessary, and you could carry it on with your other work this year.

Mr. MARLATT. The latter is the correct interpretation. The work should be continued for one or two years.

The CHAIRMAN. And you expect to continue it this year?

Mr. MARLATT. Yes.

The CHAIRMAN. Last year I noticed you appropriated for that purpose about \$4,400.

Mr. MARLATT. Year before last.

The CHAIRMAN. Yes; year before last. How much will you expend on it this year?

Mr. MARLATT. In the neighborhood of \$10,000.

The CHAIRMAN. How much will you expend next year?

Mr. MARLATT. There ought to be at least an equal sum for the next year. The work is larger than I have already indicated. We are working on the subject of insecticides and fumigation and a good deal of our work during the last year has been the effort to standardize the fumigating problem for Florida. It is a different problem in Florida from the problem in California, and the insect is a different insect. We have endeavored to introduce into Florida the gas process, which is a common method of control in California, but we find that it has got to be modified a good deal, and the experimental work this winter and last winter has been to determine the best means of applying this process in Florida. In California you can apply the gas process at any season of the year. In Florida you can apply it only during two months practically, January and February.

Mr. COOK. What do you mean by the gas process?

Mr. MARLATT. The gas process consists in inclosing the tree in a tent. The tree is inclosed in a big tent like this [indicating photograph], and within this tent hydrocyanic gas is generated. The tent is left over the tree for forty minutes, and is then pulled off by hand or by horsepower and pulled over another tree, until all the trees of a grove are treated.

Mr. COOK. That is to kill these insects?

Mr. MARLATT. That treatment is to kill white fly and scale insects in general.

Mr. HAWLEY. Is not that an expensive treatment?

Mr. MARLATT. It is an expensive treatment, but it is the only absolutely effective method that has been found. Gas permeates everywhere, while insecticide only goes where you throw it.

The CHAIRMAN. You say that treatment has been less effective in Florida?

Mr. MARLATT. It has not been used in Florida because of its expense and because of lack of experimentation to determine just how to make it effective. The problem is complicated by the fact that the white fly is winged. In California fumigation is used against insects which have no wings and which always remain on the leaf or twig where they settle as young. During the winged stage of the white fly it would be useless to treat the trees. The adult white fly enters houses and fills the streets, and is everywhere, and it would be folly to treat the trees during the season when they are flying. But there are two months in winter when there are no winged insects.

Mr. WEEKS. If you have oranges on your trees, will this affect the oranges?

Mr. MARLATT. No, sir; if it is properly done it will not affect the oranges or the leafage.

Mr. POLLARD. Where does this fly deposit its eggs, on the tree where you can get at them?

Mr. MARLATT. The eggs are all at that time (December and January) hatched. The insect is either in the larval or in the pupal condition on the leaves.

Mr. POLLARD. Do they deposit only on the orange leaf?

Mr. MARLATT. Only on the leaf.

Mr. POLLARD. So that you have them all there?

Mr. MARLATT. You have all the insects on the leaves; yes, sir.

Mr. WEEKS. Does the white fly exist in California?

Mr. MARLATT. The white fly has been up to this year known only from Florida and the Gulf region extending into Texas, but this year three points of severe infestation were found in California, viz, at Marysville and Oroville, a little north of Sacramento, and a third near Bakersfield, the latter separated only by a mountain range from the important citrus districts of southern California. The orange growers of California have long feared the coming of the white fly, and they have used all possible precautions to prevent its getting into the State. They naturally looked for its entrance through the southern part of the State, and it is evident in this northern part of California they have been more careless; at least it has escaped inspection and made an entrance. The stock which brought it into Marysville and Oroville probably came from some Northern State. The white fly is an insect that can live in any greenhouse, and the wonder is, with the traffic from one part of the country to another in greenhouse plants, that it has not gotten into California before.

Mr. WEEKS. What plants does it attack besides the orange?

Mr. MARLATT. It attacks a number of plants. In Florida the chinaberry tree and cape jasmine seem to be its favorites, and it is perhaps one of these which introduced it from the East, both being oriental trees. In northern greenhouses it is found on dwarf orange or lemon trees, but out of doors it would perish in our northern winters.

The CHAIRMAN. You say it was introduced from Asia? Have you made any effort to find out whether it has any enemies in its own native habitat that have been able to control it?

Mr. MARLATT. The belief that it came from Asia is based largely on theoretical grounds. The Asiatic records of the insect are meager and somewhat doubtful. No special search has been made in southern Asia, and there is no one there to undertake the work.

The CHAIRMAN. Has it been found in destructive numbers in other orange countries, such as Mexico or parts of South America or the islands?

Mr. MARLATT. No; until this year it has only been known from Florida and the Gulf region.

The CHAIRMAN. To what extent has it injured the orange groves of Florida?

Mr. MARLATT. The value of the crop is injured 50 per cent by the fly.

The CHAIRMAN. By the destruction of the tree or the fruit?

Mr. MARLATT. By reducing the amount of the fruit and its market value.

The CHAIRMAN. It does not actually destroy the tree?

Mr. MARLATT. No; it does not.

The CHAIRMAN. It simply reduces the amount of the fruit and its market value?

Mr. MARLATT. Exactly.

The CHAIRMAN. As the result of the work you have been doing so far, do you feel encouraged to believe that after continuing this work

two or three years longer you may be able to develop a method which will control it?

Mr. MARLATT. That is our belief, and the work has gone far enough to make us very hopeful. The fungous diseases of the white fly can undoubtedly be made much more effective by accelerating their appearance in the orchards artificially. If you leave them to appear naturally, they will be slower to develop and spread it through the orchard.

The CHAIRMAN. That is the line of work you expect to be most effective?

Mr. MARLATT. No; I think the fumigation will be in the future probably more effective than the fungus; the fumigation in January and February, particularly where the groves are isolated and there is not so much chance for the flies coming in from neighboring neglected groves, is undoubtedly the most thorough method. You can kill all of them by fumigation, and the condition of orange growing in Florida is rather favorable to such fumigation. The groves are cut out of a bit of hummock or pine land here and there and are often isolated, and they do not cover as great areas as they do in California. Those isolated groves can be handled separately and very effectively. Fumigation is rather an unfamiliar process in Florida, and our work there is to determine the exact method, to standardize it, and also to exploit it and get people to use it. Our experimental work operates in this way as demonstration work; it is experimental and at the same time it is demonstrational.

Mr. POLLARD. In regard to spraying for the encouragement of the growth of this fungus, I do not understand why that should be necessary in Florida. Of course I understand that a fungus of any character thrives best under a more or less humid atmosphere, but they certainly have that in Florida. Is there not sufficient humidity in the atmosphere there so that that of itself will afford food for the fungus, and enable it to develop?

Mr. MARLATT. The fungus where it is well established, as it is in Manatee County, Fla., will probably require no artificial aid. Two of the more important of these fungi started in Manatee County, which is on the southwest coast near Tampa, and they have spread from that center northward and in every direction, and have reached as far as Orlando, but there is a large district in the State where they have not reached.

Mr. McLAUGHLIN. There is nothing you furnish as food, but just simply the moisture?

Mr. MARLATT. No; the spores are in the water. We take a bushel of leaves and mix them in water, and hundreds of thousands of those spores float off in this water.

Mr. COOK. What is the spray for the fungus?

Mr. MARLATT. Simply the water and the leaves, thoroughly mixed.

Mr. COOK. Nothing else is used?

Mr. MARLATT. No. For example, we have collected this fall a large quantity of leaves covered with fungus. Next summer we are going to mix them with water and spray the mixture of water and spores in orchards where the fungus does not occur. That is one of the lines of work we are doing—to demonstrate that it can be spread in that way.

The CHAIRMAN. How is the white fly carried from one area to another; does it travel widely itself?

Mr. MARLATT. It has its own means of progression. It is capable of very feeble flight, but with favoring winds it may be carried several miles. Ordinarily the spread is slow, because it is an insect of feeble flight.

Mr. McLAUGHLIN. This method can be used by the people, and they can apply this themselves?

Mr. MARLATT. That is the expectation.

Mr. McLAUGHLIN. Are they doing this, or is your cooperation necessary all the time?

Mr. MARLATT. One of the largest growers in Florida is just now completing an elaborate fumigation of his entire grove, spending more than a month in the fumigation of the trees. This is being done entirely at the expense of the owner, but to insure its being properly done, his laboring men lacking the expert knowledge, we have put a man in that grove for two weeks to superintend the work. That is the largest piece of gas fumigation that has been done in Florida.

The CHAIRMAN. Has the State of Florida cooperated with you in any way, either by furnishing men or money to carry on this work?

Mr. MARLATT. There has been no direct cooperation of that kind. There is an amicable arrangement with the experiment station by which the work is somewhat divided, and certain lines of work have been looked after in part by the experiment station. But it has been necessary for us to cover the whole field ourselves, because we were better equipped for it and had the men there; but we have been in touch with the experiment station, and they have been doing some work in the same line.

Mr. POLLARD. They have been doing as much work as you have?

Mr. MARLATT. Oh, no; their work has been much less.

Mr. LEVER. How many men have you engaged in this work?

Mr. MARLATT. We have three men engaged in the work.

Mr. HAWLEY. To what extent do the growers of oranges spray their orchards with this fungous solution, and to what extent do they use the tents and fumigate for exterminating the insect?

Mr. MARLATT. The fungus hitherto in Florida has been allowed to take its own course. There has been almost no attempt to extend it. Fumigation has not been used commercially until this winter in Florida.

Mr. BEALL. How expensive is that fumigation?

Mr. MARLATT. The cost varies from 25 cents to \$1.50 a tree.

Mr. HAWLEY. It would be no use for the Government of the United States to make experiments there unless the people take it up afterwards and clean their orchards.

Mr. MARLATT. No.

Mr. HAWLEY. Are there any prospects that they will take it up afterwards?

Mr. MARLATT. Those who are progressive undoubtedly will. As soon as the demonstrations are carried out the most progressive orchardists will undoubtedly take hold and fumigate or use these fungi.

Mr. HAWLEY. Is there a State law that requires the cleaning of the orchards?

Mr. MARLATT. There is not.

Mr. HAWLEY. Then the progressive man is at the mercy of his unprogressive neighbor?

Mr. MARLATT. To a certain extent; but, as I remarked, the isolated character of the groves makes it possible for a man to get the benefit of his own work. Many of these groves are on the south side of a lake facing the water, with a pine forest back of them, and there may be one large grove there and not another grove for a mile or 2 miles, so that in a case like that a man is rather independent of his neighbor.

Mr. WEEKS. Has this fly extended to Texas?

Mr. MARLATT. Yes; it covers the whole Gulf tier of States.

Mr. WEEKS. Have you done any work there?

Mr. MARLATT. Merely exploration. A man was sent from Florida through Louisiana to Texas to determine the damage done by the white fly, but no field work was done.

Mr. HOWARD. No real damage has been done in Texas?

Mr. MARLATT. No real damage has been done in Texas. In fact, the citrus fruits are not an important crop in Texas. They are becoming so, but they are not now. That will be a problem for Texas and Louisiana in the future. The Texas and Louisiana growers of oranges are familiar with the work in Florida, and the experimental work in Florida will apply to these States as well as to Florida.

Mr. LEVER. What is the value of the orange crop of Florida?

Mr. MARLATT. My recollection is that it is about \$1,000,000.

Mr. LEVER. This pest affects it about 50 per cent?

Mr. MARLATT. Yes.

Mr. WEEKS. Do you mean the total crop?

Mr. MARLATT. The total orange crop of Florida is, according to my recollection, about \$1,000,000.

Mr. WEEKS. Do you mean that it affects the value of the crop 50 per cent, or just where the pest exists?

Mr. MARLATT. No; the crop in Florida, as a whole, is affected about 50 per cent by the white fly.

The CHAIRMAN. How long has that loss been suffered?

Mr. MARLATT. The white fly began its attacks in Manatee County and slowly extended from that center, beginning twenty years ago, perhaps. It does not to-day cover all of the orange district of Florida.

Mr. WEEKS. How much does it cover?

Mr. MARLATT. It covers perhaps two-thirds of it now. Two-thirds of the orange orchards of Florida are now infested by the white fly. It extends now well north of Orange County, just about the center of the State. It has not reached, for example, that famous orchard of the east coast known as the Hart orchard, which has the reputation of raising the finest oranges in Florida. It is now in St. Augustine. It is now spotted pretty well over the State.

Mr. HAWLEY. It attacks the fruit?

Mr. MARLATT. It does not attack the fruit; it works on the leaves, but the results of the insect appear on the fruit, because the black fungus covers the whole plant.

The CHAIRMAN. I would like to ask Doctor Howard now if he will let us know the results of the work on the grape-root worm.

Mr. HOWARD. I would like to have Mr. Quaintance tell you about that, and also the work on the pear thrips.

STATEMENT OF MR. A. L. QUAINANCE.

Mr. QUAINANCE. Mr. Chairman and gentlemen, in conformity with a provision by your Congress last year, the Bureau of Entomology began work on the grape-root worm, locating a station near North East, Pa., which is in the center of the Erie grape belt. We had to the south of us the Ohio grape belt and to the north of us the Chautauqua grape belt, and while nominally confined to the North East section, our observations extended up and down Lake Erie, practically covering the important commercial grape acreage of the eastern United States. This work has been of two kinds, experimental and demonstration work. The demonstration work has had for its end a teaching of methods already known to be of more or less use and to secure their adoption by the growers. In this connection at this time I would like to hand to the members of the committee, with your permission, a card showing the life stages of the grape-root worm. The life history of the pest is briefly this. The insect winters in the ground in the larval stage. About the time the grape vines are pushing out in the spring the larvæ change to pupæ and later to the adult stage, the beetles feeding upon the foliage for a week or ten days and then deposit their eggs along the canes under little strips of bark. The eggs hatch and the larvæ, or grubs, fall to the ground and go to the roots and there feed for the rest of the season until hibernation time on the roots of the grapes, and it is in this way that the injury is done. Very frequently grapes are allowed to produce too much wood and overbear and the injury of the insect on the roots soon causes a great reduction in vigor of the vines, and in one year, in the case of small vines, these may be actually killed. Two or three year old vineyards will be shortly killed by the insect in the absence of remedial work.

The grape-root worm may be fought in two or three ways. The fact that the beetles feed for a short while on the foliage permits of their poisoning if we spray promptly and are informed just when it should be done. This period in general will be about the close of the blooming period and that has been one of our principal lines of work, to get accurate figures covering as great a range of soil conditions as possible, determining just when we should spray and with what and the effect. I should like to hand to you also a photograph showing some features of the work. This illustration here [exhibiting], for instance, is to show the effect of their feeding on and destroying the little rootlets that extract from the soil the plant food. This [exhibiting] is the cane growth on a badly infested vine and this [exhibiting] is a more normal growth from a vine that has not been infested.

Mr. GILHAMS. I notice that these little beetles here are brown. I have noticed them on my vines that are exactly like these, except that mine are black. Why the difference?

Mr. QUAINANCE. This species varies from brownish to darker. That brownish color is due to the little brown hairs with which they are covered. Those are often rubbed off, especially in old specimens, and then you get the darker color; but the beetle varies somewhat in color.

Mr. GILHAMS. The damage is done by the insect in the larval stage?

Mr. QUAINANCE. In the larval stage, under the ground. The insect can be fought by timely and special cultivation. In the spring, just before the formation of the pupæ, the larvæ work up near the surface of the soil, so that after pupation the beetle will be near the top and it will not be difficult for it to escape. It has been found that by throwing the earth to the vines in the fall and thus furnishing them places for pupation somewhat near the surface, and then in the spring throwing that earth away before they have emerged as beetles, it is possible to largely destroy them; and that method of cultivation is being tested carefully. One other possible method is in jarring the vines, but this is not practiced because of the success we have had with these two other methods. The larvæ injure the roots of vines, and the vineyardist often is not aware of their presence until the poor condition of the vineyard attracts his attention.

The problem of renovation of badly injured vineyards has come up, and we have done some work along that line by proper pruning, thus reducing the wood production, and by the use of fertilizers and timely cultivation. We have in all some 18 or 20 acres under treatment in this renovation work, and we hope that we will be able to bring out vineyards that have been practically destroyed or that would have been destroyed entirely in another year, and make them profitable again by a system of treatment. This would include spraying, timely cultivation in the spring, proper pruning, and the use of fertilizers.

The CHAIRMAN. And by these means you believe it possible to control the pest so that it will not be a very great source of danger?

Mr. QUAINANCE. We believe that a large percentage of the injury can be reduced.

The CHAIRMAN. Have you had any cooperation from either of the States in which you have done your work, either from the States themselves or from organizations, or from individual owners?

Mr. QUAINANCE. We have had the warm cooperation of grape growers in this territory, and they have been very much interested in this work. It was undertaken at the instigation of these grape growers, and they are very much interested, and are following closely the Department's work.

We invited the cooperation of the State entomologist at Harrisburg, and at that time he was not able to cooperate from lack of funds. I am glad to say, however, that during the last spring we have had under discussion a cooperative arrangement, and during the coming season we shall cooperate with the authorities in Pennsylvania in this grape root worm work.

The CHAIRMAN. About how much money are you spending on this work this year?

Mr. QUAINANCE. We have three men there, and we are spending perhaps \$5,000 or \$6,000; perhaps a little more.

The CHAIRMAN. How much will you probably want to spend this next year?

Mr. QUAINANCE. We should have at least as much. The work should be continued over three or four years. In the case of a crop like the grape, we are not able to determine possibly in one season or two seasons, just what the value of the work is, and as I say the work is somewhat of a demonstrational character. It is often as difficult to secure the adoption by growers of methods that are known to be

of value, as it is to devise new methods. I think this a legitimate feature of our work.

The CHAIRMAN. I understand from what you say that the remedy has been practically worked out now, and what you expect to do the next two or three years will be chiefly in the line of demonstration work, will it not, to carry that information to the vineyardists?

Mr. QUAINANCE. We know rather accurately the value of spraying; we have determined that. In regard to the exact value of cultivation, it is more difficult to get statistics on a point of that kind, but the renovation and bringing out of vineyards that have been badly injured is an untried proposition, and we should give that careful attention, because there is a large acreage there that possibly may be brought out, as against being cut down. Those vineyards are now unprofitable, and we think we can bring them out and make them profitable again, and we think that work at least should be given considerable attention.

The CHAIRMAN. And you expect to continue it on about the same scale on which you are now conducting it?

Mr. QUAINANCE. That is the plan.

The CHAIRMAN. What is the form of the spray you use?

Mr. QUAINANCE. The arsenical poison which we have used is arsenate of lead. That is used on grapes always in combination with Bordeaux mixture, for the black rot or mildew, and insects that attack the grape, especially the grape-berry moth. The formula is, copper sulphate 4 pounds, lime 5 pounds, water 50 gallons, and two or three pounds of arsenate of lead, making a combination fungus and insect treatment.

The CHAIRMAN. Have you found any parasites that worked on this beetle?

Mr. QUAINANCE. Yes, we have found two or three parasites of the eggs; not in sufficient numbers as yet to indicate that very much may be expected from them. The life of the insect is such that it is largely protected from infestation by parasites. The pupal and larval states are passed under ground. The egg stage is the only one parasitized, and that is passed on the cane, on the vine.

The CHAIRMAN. Has this pest appeared in any other section of the country except the parts you have named?

Mr. QUAINANCE. It is not troublesome. It had its beginning as a pest a few years ago when the low prices of grapes caused a considerable neglect of the vineyards, especially in Ohio, along Lake Erie, and the insect got a great headway. During recent times, when the crop has been so profitable, the desire has been to control this insect.

Mr. GILHAMS. It is the beetle that deposits the eggs?

Mr. QUAINANCE. Yes.

Mr. GILHAMS. Where does it deposit the eggs?

Mr. QUAINANCE. Under the loose bark up and down the canes.

Mr. GILHAMS. Never on the leaves?

Mr. QUAINANCE. Never on the leaves, so far as I know.

Mr. HAWLEY. Are there any of the grape growers in the neighborhood where you are working who are following your methods?

Mr. QUAINANCE. Yes, a great many of the larger and more prominent growers are.

Mr. HAWLEY. You expect that the people generally will follow this method and clean their vines?

Mr. QUAINANCE. I think they will. They are much interested in it, and we have had meetings occasionally, and the grape growers turn out in large numbers, and I think that the work is fully appreciated in that section.

Mr. HAUGEN. How about the experiment stations; do they cooperate with you?

Mr. QUAINANCE. The State experiment station of Pennsylvania has no entomologist. The entomological work is done under the State department of agriculture at Harrisburg, and we will have cooperative relations, I think, with Prof. H. A. Surface, the entomologist, beginning with the present season. We have not had it before.

The CHAIRMAN. Has the State experiment station attached to the agricultural college been doing any work?

Mr. QUAINANCE. They have not; they do not have an entomologist.

Mr. HAWLEY. Are these vineyards shown here some that belong to you, or are they vines that belong to private growers.

Mr. QUAINANCE. Those belong to private growers and the growers are furnishing us their vineyardists for experimental and demonstration work, showing their interest in the matter.

Mr. GILHAMS. When this larva is hatched out does it begin to feed on the leaves and blossoms?

Mr. QUAINANCE. On the roots. They work their way to the roots when they are hatched out and begin on the little tender roots of the vines, and they soon chew those all off.

Mr. LEVER. When do you begin this spraying?

Mr. QUAINANCE. As soon as the blossoms have fallen, as many as three or four applications being necessary in one season.

Mr. HAWLEY. Is it so expensive as to be appreciable in the total value of the grape crop? How much would it be in proportion to the grape crop?

Mr. QUAINANCE. It costs about \$1.50 an acre for a treatment, \$6 an acre for a season would be a large allowance.

Mr. HEFLIN. I see by the picture that you have the horses covered during that spray work; why do you cover the horse?

Mr. QUAINANCE. The spray is broken into a fine mist, and if the weather is windy, the horses are more or less besprinkled with the spray.

The CHAIRMAN. Will you tell us about some of the other work you have been doing?

Mr. QUAINANCE. In 1904 there appeared suddenly in the Santa Clara Valley a species of thrips that was at that time unknown to science, and that spring it did an enormous damage by injuring the deciduous fruit trees.

The CHAIRMAN. Suppose you describe that pest; I think it is probably made known now to this committee for the first time.

Mr. QUAINANCE. The insect is very small. This is quite an enlarged illustration you have here. Those of you who have examined roses carefully have often seen little yellow insects scooting across the petals, or on flowers. They belong in the same genus and are very nearly related, but the pear thrips is black in color,

whereas the little fellow in the rose is yellow. The life history is very interesting, and it has been worked out by a member of the bureau who is now on the ground in California and will carry out extensive experiments when the insect appears in the spring. It spends the winter in the ground in the larval and pupal stages, appearing in the spring as the buds and flowers are opening. They come out of the ground in enormous numbers and fly to the flower buds and feed on the stamens and the pistils, and a few punctures will blight the blossom so that there will be no fruit.

Mr. HAWLEY. What kind of fruits do they attack?

Mr. QUAINANCE. Deciduous fruits, the peach, the pear, the plum, and especially the cherry, and they have done an injury amounting perhaps to not less than \$750,000 or \$1,000,000 in the year in the Santa Clara Valley. The insect is now spreading and is now known in the Upper Sacramento Valley. There is every reason to fear that it may spread to the east.

Mr. POLLARD. Do you know where it came from?

Mr. QUAINANCE. We do not. Its affinities are apparently American.

Mr. POLLARD. It has not appeared elsewhere?

Mr. QUAINANCE. Not outside of California, that we know of. It may spread at any time. This little bulletin contains several plates and figures prepared by Mr. Moulton, now in charge of the work on the Pacific coast. The insects infest the flowers for some time in the spring, deposit eggs in the leaves, in the filaments of the stamens, etc., and these hatch to larvæ and these also feed on the leaves and buds until they have attained their growth, which is in three or four weeks, and then they go to the ground and spend the rest of the season, the late summer, fall, and winter underground and come out in the spring, there being only one generation in a season. The method of cultivating fruits in that valley makes it probable that cultural methods may be used to an important extent. They irrigate in the winter when the water is available, and cultivate, and we have a plan which we think will enable the grower to control this pest by destroying it in the ground by a combination of irrigation and cultivation practices, and before the adults come out.

Mr. HAWLEY. Do they go close to the trees when they go into the ground, right under the trees?

Mr. QUAINANCE. They are scattered very generally over the ground. We are trying the effect of various sprays. The trees are of such size that thorough spraying is very difficult, and we have more confidence in cultural methods and destroying the insect in the ground than spraying.

The CHAIRMAN. How long have you been working on this problem?

Mr. QUAINANCE. That was not undertaken as a problem until the 1st of July of last year.

The CHAIRMAN. How much are you spending on it this year?

Mr. QUAINANCE. About \$5,000; or, perhaps, nearly \$6,000.

The CHAIRMAN. Do you expect to continue the work next year?

Mr. QUAINANCE. Yes; we feel that we have just begun on this work.

The CHAIRMAN. And you will probably use about the same amount of money?

Mr. QUAINANCE. At least that much; perhaps a little more. We could extend that work very profitably.

The CHAIRMAN. Have you any estimate at all of the length of time it will take you to work it out?

Mr. QUAINANCE. I should think in two years at least we ought to be able to know just what we can expect to have from these different remedies. The cultural method will need longer than the direct remedial work. It is very difficult to find just what you have done in those cases.

The CHAIRMAN. How wide an area is affected?

Mr. QUAINANCE. The Santa Clara Valley, or that portion of it that is infested, is perhaps 20 miles long, varying in width from a mile to five or six miles.

The CHAIRMAN. And it appeared in this section first of all?

Mr. QUAINANCE. It first appeared and was first known in this section. It has, however, spread to other valleys in the more northern portion of California, in the Sacramento Valley, and will probably attract serious attention in the spring. We should have a man up there to investigate the conditions also.

The CHAIRMAN. It has not been reported in any other States?

Mr. QUAINANCE. No, sir; it has not.

Mr. HAWLEY. Are the private growers following your methods?

Mr. QUAINANCE. We can not say that we have advised any methods. We just began the work on this problem on July 1.

Mr. HAWLEY. Do you get any assistance from the State of California, from the agricultural experiment station at Berkeley?

Mr. QUAINANCE. No; they have left that problem to us, and there are no cooperative relations. They wish us well, and we have their hearty sympathy in the work, but they are not cooperating.

Mr. HAUGEN. To what extent are the other experiment stations cooperating with you in your line of work that you are carrying on in any of the States?

Mr. QUAINANCE. To a considerable extent.

Mr. HAWLEY. What do they do, furnish men or money, or both?

Mr. QUAINANCE. They do both, or one or the other, as the case may require. We have had cooperative work in the South, in Georgia and in Texas, and always with good results.

The CHAIRMAN. Has the State of California an entomologist?

Mr. QUAINANCE. They have an entomologist with the experiment station, Professor Woodworth, and they maintain a State horticultural commission which employs a number of entomologists who devote considerable time to inspection work. They have an inspection service for excluding insects of other countries.

The CHAIRMAN. And they have not attacked this problem at all?

Mr. QUAINANCE. They have not.

The CHAIRMAN. I think you have covered the ground pretty fully, and if no other member of the committee has any questions to ask, we will continue with Doctor Howard.

STATEMENT OF MR. L. O. HOWARD—Continued.

Mr. HOWARD. In regard to the experiment station of California, answering the question that was just asked, this appropriation was made largely on the strength of a speech made on the floor of the House in the discussion on the bill last year by Mr. Hayes, of California. You yourself made that point, Mr. Chairman, as to why

the State of California, through its experiment station, did not carry out that work. Mr. Hayes's very diplomatic reply was that while they had a State entomologist who was a very good man, they preferred to have the work done by the Bureau of Entomology of Washington, on account of its larger experience and broader view.

The last moment, before the vote was taken, a gentleman from Tennessee arose on the floor and put in an amendment to the effect that the words "insects affecting the dark tobacco belt of Kentucky and Tennessee" be also included in the bill. That was a sort of impromptu motion, but it went through with the bill, and therefore this last investigation out of our ordinary investigations has come up, which is an investigation of the insects affecting the dark tobacco belt of Kentucky and Tennessee. The money became available on the 1st of July, and we sent a trained assistant to the region after entering into cooperation with the experiment stations of both States—and I may say, incidentally, that we never go into a State without making practically sure that we are not treading on the toes of the State station. We want their cooperation, and if they like to have us come and want to cooperate with us, or want us to come and are not able to give us financial support, we then go in. After making arrangements, as I say, with the State experiment stations of Kentucky and Tennessee, I sent an expert to look over the ground and see what the problem was.

Mr. POLLARD. I understood you to say that you would not go into a State unless you could formulate a plan to cooperate with the State experiment station. Take this instance where a specific appropriation was made for a specific piece of work; if you found that the State experiment station of Tennessee refused to cooperate with you, under those circumstances would you refuse to go into the State?

Mr. HOWARD. No; we would tell them, "We are obliged to go in, because Congress has ordered it." All my effort is to make it just as smooth and pleasant as possible.

Mr. POLLARD. I was wondering what you would do in a case of that kind.

Mr. HOWARD. Congress is supreme in such matters.

Mr. LEVER. Do you find any disposition not to cooperate with you?

Mr. HOWARD. No; I find a disposition to cooperate; but I am perfectly aware of the criticism of the Department at Washington that holds in certain experiment stations.

The CHAIRMAN. Have you ever had this situation; that an appeal has come to you from some State in controlling a certain pest, and you have turned that appeal over to the State authorities, the State agricultural college or experiment station, and found that they were doing the work that your correspondent had asked you to do?

Mr. HOWARD. No; I think not. I think I have not had that experience. Several times it has occurred that we have had appeals from the States, and we have advised them to consult their agricultural experiment station, and they have applied to the State agricultural experiment station and received the reply that they were familiar with the problem but had no money to make the investigations, and they would be glad if we would take the matter up. That has happened several times.

The CHAIRMAN. Will you continue?

Mr. HOWARD. I found that at neither of these stations, in Kentucky or Tennessee, did they have men who had time to go into this particular investigation, but they were quite cordial, and anxious to have us take it up. I sent this member of the Bureau to those States, and he has looked over the whole ground and has located his problem, and I hold in my hand his report in which he points out what he thinks ought to be done, and he has begun certain experiments in that region. It seems that that region in Kentucky and Tennessee is very valuable land, and that they grow a crop of tobacco that is worth a great deal, and there is danger from the Northern tobacco worm and the Southern tobacco worm, cut worms, leaf beetles, and two or three other insects. They are wasting a great deal of money in worming the plants by hand for the Southern tobacco worm, and he suggests that we begin early spraying. Late spraying has been considered dangerous, but it may be that we can do it by early spraying. We have started the study of the insects, which accumulate on the suckering tobacco after the tobacco has been cut. It happens that in autumn, after the tobacco has been cut and marketed, the suckers come upon the stems, and the insects concentrate themselves on those suckers. The suckers are valueless, and therefore it is a simple matter to destroy the plants in bulk, and therefore destroy a large number of insects that would otherwise hibernate and do damage next year. The work is just starting. We have merely an outline of the work to be done during the coming season. We did not begin with the beginning of the growing season last year. We must begin with the beginning of the growing season this year. I think we can finish up this investigation in the coming year, that is, in one year more.

The CHAIRMAN. How much money will you spend on it this year?

Mr. HOWARD. We are devoting \$2,500 to it this year, and perhaps \$3,000; and the results we will obtain there will answer for a large part of the middle tobacco belt.

The CHAIRMAN. When you say you will finish it up, you mean that within a year or two you will have developed methods of spraying or other methods which will control the pest?

Mr. HOWARD. I think so, without doubt.

The CHAIRMAN. Then do you think you can put that information into a bulletin in such shape that growers will utilize it?

Mr. HOWARD. We will put it into a farmer's bulletin and print it in a large edition, so that when we have any question about those insects we can give the information.

The CHAIRMAN. Has it been your observation that farmers have been able to utilize the information which goes into your bulletins?

Mr. HOWARD. A few of them are, but many of them are not. The best growers always will put our recommendations into practice. There will be a large majority of them, however, who will not, and so far as they are concerned it might just as well not have been printed; that shows the value of demonstration experiments.

The CHAIRMAN. The most effective way to get the information to the people is to demonstrate it to them in their presence?

Mr. HOWARD. The most effective way; and these demonstrations not only have a demonstrational value, but they have a practical effect of a valuable character on the work in the laboratory. We find that certain things are remedies, and we advise them, but we do not know that there may not occur elements in a large-scale

experiment which would vitiate the experiment to a large extent, and therefore when we conduct an experiment on a very large scale it acts as a demonstration if it is successful and also as an experiment that has more value than a laboratory experiment or a small-scale field experiment. That is an additional argument in favor of demonstration work. We have a cooperative agreement with the station in South Carolina and with the Utah station, and a less close cooperation with a number of the others. The entomologists of the country as a whole—that is, the station entomologists—are a very compact and united body. There is very little jealousy among us, and we are helping each other every way we can, and I think we are practically harmonious.

Mr. HAUGEN. You think it is a great advantage to cooperate with the stations?

Mr. HOWARD. Yes; undoubtedly so.

Mr. HAUGEN. If you should cooperate with the stations, would it not be possible to turn over to them a large amount of the work and thereby save the Government the expense of that work?

Mr. HOWARD. These things all involve the expenditure of money which Congress appropriates. The only way we could do that would be by turning over certain of this money to the experiment stations.

Mr. McLAUGHLIN. If Congress makes the appropriation, are you bound to use it?

Mr. HOWARD. We ought to use it ourselves.

Mr. HAUGEN. I agree with you on that, but Congress has increased the appropriation for the experiment stations, for the purpose of carrying on experiments that are being carried on by the Department, and it occurred to me that if you should cooperate with the experiment stations it would enable the experiment stations to carry on these investigations with less expense than is involved in their being carried on by the Department.

Mr. HOWARD. A great deal of this investigation could be carried on by the experiment stations practically as well as we can do it, except for the fact that they are restricted by State boundaries and we have a larger range and can handle a problem as a whole. But the question of insect damage is so great, and there are so many things to be taken into account, that I hope the idea that Congress can economize in this way will not be very strong in your mind.

Mr. HAUGEN. It is of great importance to certain States—for instance, California—and I understand you to say that California is not cooperating with you. California is certainly one of the greatest fruit-growing States; fruit growing is a great industry there, and if this is so important it occurs to me that the State ought to be interested enough to cooperate with the Department.

Mr. HOWARD. I agree with you. The State of California ought to do more; there is no doubt about it.

The CHAIRMAN. Have you given any attention to the "green bug" that infested the wheat fields in the Southwest?

Mr. HOWARD. Yes.

The CHAIRMAN. What work have you done along that line?

Mr. HOWARD. I understand that Mr. Randell, of Texas, has introduced a bill making an appropriation for the purpose of investigation of that insect.

The CHAIRMAN. What I wanted to know particularly was what you had already done in the way of investigating it.

Mr. HOWARD. Under the auspices of Professor Webster, of the Bureau of Entomology, three or four men were sent down into Texas and Oklahoma during the great outbreak of last year, and they have been studying the problem ever since. I have here a map showing the country which was covered by those men in the investigation of the "green bug" last season. They traced the spread of the insect almost directly north to the Canada line and east to the Atlantic. They worked out many details of its life history and conducted some very interesting experiments in the transportation of parasites from Texas and Oklahoma into northern fields, with the idea that by bringing these parasites up in bulk they could induce them to multiply rapidly enough to stop the "green bug." These experiments were not successful.

They conducted one experiment which was of such interest and on such a large scale that you may be interested in knowing its details. Near Wellington, Kans., they took two experimental wheat or oat fields at a distance of several miles apart. Into one of these fields they introduced in May no parasites whatever, but they brought up some hundreds of thousands of parasites and introduced them into the other field. In the beginning of the season they made an accurate estimate of the percentage of parasitism in both fields, and then into the experimental field they introduced these hundreds of thousands of parasites from Oklahoma. Then at the end of three weeks another count was made, and in the check field they found that the parasites had increased as rapidly as in the experimental field, which showed that the introduction of parasites had no effect.

Mr. POLLARD. Do I understand that these parasites accompanied the "green bug," and that they were present there before you brought them up?

Mr. HOWARD. Undoubtedly so. The parasite will put in its appearance wherever the "green bug" puts in its appearance and will develop rapidly. So that under the experiments of last year it would seem that there was no advantage in bringing up parasites.

Mr. POLLARD. Did they appear further north?

Mr. HOWARD. This was the only experiment, but the parasites did appear further north through the entire range.

The CHAIRMAN. Do you know anything about the work done by Professor Hunter?

Mr. HOWARD. Yes; he was assisted in his work by one of our own men stationed at College Station, Tex. It seemed to be effective, but it lacked the immediate check which we had in our experiment—a check field to show that things would occur in one field without introduction that occurred in the other with introduction. He had a number of parasites brought up from Texas and Oklahoma and introduced them in certain fields, and finding that the "green bugs" were all parasitized after a length of time, he laid it to his introduction; but our experiments would go to show that it was not due to his introduction of the parasites, but that the same condition would have occurred if he had not introduced any at all.

Mr. BEALL. Are not entomologists all agreed that the parasites occur wherever the "green bug" occurs?

Mr. HOWARD. I do not know what the other entomologists think.

Mr. BEALL. Take Doctor Hunter, in Kansas. He says:

On the 14th of April last year it was evident from reliable sources, namely, the packages of infested wheat referred to, and reports, after personal examination of Agent Sanborn, of the Federal Bureau, of areas shown in the accompanying chart, that the "green bug" was present throughout the wheat area of the State (Kansas) and the principal natural enemy, the parasite, was not found anywhere in the State except at one point on the extreme southern border; that the weather conditions were such as to hinder, if not preclude, its wide distribution naturally.

Is that in consonance with your investigation?

Mr. HOWARD. What was that date?

Mr. BEALL. The 14th of April.

Mr. HOWARD. That does not necessarily conflict with our ideas. Perhaps by the first of May the parasites would have been present in great numbers, or, if the weather were favorable, perhaps earlier.

Mr. BEALL. The "green bug" was present, but they were not able to discover the parasite?

Mr. HOWARD. But you see the weather was unfavorable; it was rainy weather.

Mr. BEALL. Yes. Then, as I understand you, under certain conditions, weather conditions, the "green bug" may be present and the parasite not be present?

Mr. HOWARD. The parasite may not be obviously present; that is the point.

Mr. BEALL. How would it be present at all?

Mr. HOWARD. It might be hanging on a twig or walking up the bark of a fence post, or something of that kind. The point is that these parasites are generally distributed. They occur throughout the whole possible range of the "green bug."

Mr. BEALL. Then the parasite may be present, but on account of the weather conditions, or because of some other local conditions, it may not operate on the "green bug?"

Mr. HOWARD. That is it. It never operates on the "green bug" in wet or cold weather. The "green bug" itself breeds in cold or wet weather, but the parasite can not fly in moist weather or in cold weather. It is a thin-winged creature, and it can not fly in moist weather; but the minute you have clear, warm weather, it begins to lay eggs and multiply. When you have, as you had five years ago in Texas, a tremendous threatened outbreak of the "green bug," and you have clear weather, as you had then two weeks of clear weather, the parasites appear and multiply, and the "green bug" is checked.

Mr. BEALL. What does the parasite do to the "green bug?"

Mr. HOWARD. It lays an egg in each "green bug," and the egg hatches into a grub that eats it out. The "green bug" pest is absolutely dependent upon weather conditions by virtue of this action of the parasite.

THE CHAIRMAN. Have you heard anything from the "green bug" this winter?

Mr. HOWARD. Yes; it exists in northern Texas.

THE CHAIRMAN. It is present in Texas?

Mr. HOWARD. In north Texas and in southern Kansas we are watching it closely, and I am inclined to think that if we had sufficient money, we would send some men into the field and make some observations.

Mr. BEALL. What would you do?

Mr. HOWARD. I do not know; only send them down to find out.

The CHAIRMAN. I may say that the manuscript from which Mr. Beall has been reading is a report that Professor Hunter made to the State agricultural society, I believe, and I noticed by the newspapers that he had asked our legislature, which is in special session, for an appropriation of \$10,000. He feels quite confident that by artificially spreading the parasite the pest can be overtaken. Do you think there is a reasonable hope of that?

Mr. HOWARD. I think there is good ground for experimentation, a good field for experimentation. I hope the legislature will give it to him. I should like to see the experiments carried on more than they have been. I do not contend that our experiment of last spring was a conclusive experiment; it is possible that they may find that under varying weather conditions these experiments, under certain circumstances, may succeed.

Mr. POLLARD. How much do you think you ought to have for the experiments?

Mr. HOWARD. Mr. Randell and Mr. Beall were calling on me the other day. Mr. Randell had introduced a bill for \$100,000, and I told him I thought that was too much, and he asked me how much I would like to have, and I told him if we could get \$10,000 immediately available, with a continuation after the 1st of July, we could probably do work that would count.

Mr. POLLARD. How much is that?

Mr. HOWARD. Ten thousand dollars, to be used between now and the 1st of July.

The CHAIRMAN. Have you not got that amount as a sort of emergency amount in your present appropriation?

Mr. HOWARD. No; the money is all allotted, except a certain sum for general expenses which will not much more than carry us through. I doubt if we have an unexpended balance of any size at the end of the year. After the call of Mr. Randell and Mr. Beall, I got the man in charge of this particular branch of that work, Mr. Webster, to draw me up a little estimate of what he could do with that amount. He estimated for field expenses for six men, four and a half months, \$4,500; salary of men, four and a half months, \$2,000. Besides this all items of equipment, rent of laboratory quarters when necessary, and supplies therefor make the amount somewhere between \$6,000 and \$10,000.

The CHAIRMAN. As I understood you to say in your introductory remarks, it is your practice to leave a certain portion of your appropriation unallotted for use in special emergencies that might come up?

Mr. HOWARD. Yes, sir.

The CHAIRMAN. Have there been any emergencies that have called for such an appropriation this year?

Mr. HOWARD. That was a small amount, and the men who have allotments under the general sum have come to me under one plea and another and asked for a few hundred dollars more for this purpose and that purpose, and the money is practically gone. It would be unwise to spend any more of that money on this work.

The CHAIRMAN. If you had this money immediately available, what would you do in the "green bug" problem?

Mr. HOWARD. I should do as Professor Webster suggests here, send at least six men down into Texas to look the ground over and make

up their minds what it would be best to do; what would be the best line of experimentation. I do not know myself.

The CHAIRMAN. Has Texas done anything in this line that you know of?

Mr. HOWARD. I think not.

The CHAIRMAN. The State of Kansas was very badly damaged by the "green bug" last year, but no request has come to us from any one in the State this year for help from the National Government, because the people think evidently that it is a matter that their own authorities can handle, and they are asking their own legislature to appropriate for the expenses. You do not know whether there is anybody in Texas who is qualified to handle this question down there?

Mr. HOWARD. There is a man, who is the entomologist of the Texas Experiment Station, the principal part of whose salary is paid by the Bureau of Entomology. That is the way we are working in cooperation with the Texas station; their entomologist is largely paid by the Bureau of Entomology here. He conducts certain investigations on this very class of insects. That is Mr. Sanborn. He is the man who cooperated with Mr. Hunter in Kansas last year, and in fact he at the present time is working upon problems connected with the "green bug."

The CHAIRMAN. Is it not rather unusual for your Bureau to pay any part of the salary of a member of the faculty of a State agricultural college?

Mr. HOWARD. He is not a member of the faculty; he is the entomologist of the station. I think he does nothing in the faculty.

The CHAIRMAN. Do they give him a part of his salary?

Mr. HOWARD. We give him \$100 a month and they give him \$400 a year and his house and laboratory and a certain amount for his supplies.

The CHAIRMAN. And what part of his work is done under your direction?

Mr. HOWARD. Practically all of it.

The CHAIRMAN. He is the only man in Texas, as I understand it, who might do this work?

Mr. HOWARD. He is the only man; yes, sir.

The CHAIRMAN. Do you think if he had a sufficient appropriation that he could go ahead and accomplish as much, perhaps, as anybody who might be sent from the Bureau here?

Mr. HOWARD. Measureably so.

The CHAIRMAN. It is really a question of money, then, is it not?

Mr. HOWARD. A question of money; yes, sir.

Mr. POLLARD. How much was done by the Department last year on these "green bug" experiments?

Mr. HOWARD. I was at that time in Russia hunting for parasites of the gypsy moth, and Mr. Marlatt had charge of it, and I would suggest that you let him tell you about that.

Mr. MARLATT. The "green bug" invasion, as the chairman knows, caused a great deal of excitement in the western papers, and among the farmers, and it was brought to the attention of the Secretary of Agriculture, and the latter authorized us to send all the men we could out there, and we sent three assistants, and they put in six weeks on the work. * The cost in excess of what we would nor-

mally have put into it is probably \$500 or \$750. The results of the work were published in a circular which gives a very clear statement of the conditions governing the "green bug" and its parasite. This circular has been widely distributed, but that could be hardly counted in as a part of the cost.

I took a great deal of interest in the problem at that time, and there is one point that Doctor Howard has perhaps not sufficiently impressed on the committee, viz, that the introduction of the parasite is an unnecessary feature, or was last year. The parasite covers the whole region every year that the "green bug" covered last year. It is a parasite not only of the "green bug," but of other plant lice, and is on the ground all the time.

Mr. POLLARD. Before the "green bug" comes?

Mr. MARLATT. Before the "green bug" comes. The "green bug" thrives in an open winter like this winter or such as last winter was, and the parasite can do nothing until the weather conditions are favorable. Last spring when the "green bug" swept up over Kansas, my native State, it did a great deal of damage in the southern tier of counties up to the time that the weather conditions were favorable for the parasite. The moment the weather conditions became favorable for the parasite the latter appeared in large numbers, and the "green bug" was wiped out, not only where Mr. Hunter made his introduction of the parasite, but everywhere else. The introductions did not do a particle of good. That is the situation from last year's work, and if Kansas gives an appropriation of \$10,000 this year it may be valuable as an experiment, but from past history it is probable that the money will not yield a single valuable result to the wheat crop.

Mr. POLLARD. I would like to inquire whether in your judgment this committee could insert an item for the carrying on of this work with the expectation of getting any valuable results? As I understand you think there is nothing to be done?

Mr. MARLATT. As an experimental problem it is all right to spend a limited amount of money in working with these parasites. The results of last year, as I say, indicated that the work was absolutely futile. Under other climatic conditions some good might come, but from the outlook of last year, and the study of the problem, it does not appear that there would be much good from the introduction of the parasite. If there is any good to be gained it is not in Kansas or Nebraska, but down in Texas during the winter. The "green bug" may work in Texas during the winter and get an enormous start and then be carried north by the prevailing winds. An interesting point in this connection is that in the very movement north the insect carries its parasite with it. Of course the parasite becomes more abundant in Texas where the green bug gets in its work two or three months earlier. Summer comes two months earlier in southern Texas than in Kansas and Nebraska. This parasite lives in the abdomen of the louse, and the lice may fly with the parasites in them. Parasitized insects have been picked off of the windows of railway trains in Kansas, which shows that the parasite is carried by the flying plant lice. It does not seem likely that the introduction of parasites artificially into Kansas, southern Illinois, or Missouri, is going to be of much benefit.

The CHAIRMAN. The only possible hope of controlling the pest is through the activity of parasites, is it not?

Mr. MARLATT. The pest is controlled at every step by the parasite, and always has been so controlled in the past.

The CHAIRMAN. And you would not expect to develop any other remedy except the parasite?

Mr. MARLATT. No, except in Texas, for example, in winter it may be possible to find a colony in the field, a small point where the "green bug" is starting, and stamp out that spot—cover it with straw and burn it, or spray it with kerosene; but that is a local measure and the results to be gained from it have not been demonstrated.

The CHAIRMAN. In view of the very wide area over which the "green bug" is distributed, and the great rapidity of its reproduction, is it likely you would ever be able to corral enough of them in any one place to make the destruction of that particular patch of any account in the grand total?

Mr. MARLATT. Probably not. When the weather conditions are favorable for the "green bug" you will have damage from it. That is, it works under special conditions of climate. Last winter was an open winter and in Texas the "green bug" multiplied right through the winter. Whenever you have the weather conditions you will have "green bug" damage. Since the first appearance of the "green bug" in this country there have been several such outbreaks, each time following a particularly favorable climatic condition. It is climate that governs the "green bug"—that is, climate favorable to the bug and unfavorable to the parasite.

The CHAIRMAN. How many times has the "green bug" appeared in destructive numbers in this country?

Mr. MARLATT. Three or four times, Mr. Chairman. Its first appearance, if I remember right, was in 1884.

Mr. BEALL. In what section of the country?

Mr. MARLATT. At that time it appeared in Virginia. It is a pest that covers the whole country and extends from the Rocky Mountains to the Atlantic coast.

The CHAIRMAN. It is always in existence somewhere?

Mr. MARLATT. Yes; it is always in existence somewhere.

The CHAIRMAN. And in some seasons favorable conditions promote its propagation, and it becomes a pest?

Mr. MARLATT. Exactly.

The CHAIRMAN. And then for several years it may pass away?

Mr. MARLATT. Absolutely, and no report be made of it, and no real damage caused by it.

The CHAIRMAN. Then about the best thing we can do is to allow the climate and the parasite to take care of it?

Mr. MARLATT. That is about all the control that it will have in the future.

Mr. POLLARD. I wanted to inquire whether this bug lives through the winter in Nebraska, for instance, or does our cold weather there destroy it, so that the crop of bugs that we get next year, if we have them, come from the South?

Mr. MARLATT. I can not answer that question definitely. Perhaps Doctor Howard can.

Mr. HOWARD. No; that is one of the points on which we need more investigation. There are a number of such problems, as Mr.

Marlatt states. It sounds simple enough, but there are other points which need investigation. We do not know enough about the alternate food plants of the insect. It has some food plants on which it lives in the fall, and it may be that by carefully studying it in these relations, we might get hold of some idea that would be very good. We have done it so often; in the face of apparently insuperable problems we have got hold of some one point that has given us a solution.

Mr. BEALL. How long has this been under the consideration of the department, this problem?

Mr. HOWARD. I think Mr. Sanborn has been on it two years, now. He is our agent in Texas. Mr. Webster and his field force which he sends out through the country has been only handling it the last year.

Mr. BEALL. As I understand, you have not reached such a definite conclusion about the matter that you would not think it profitable to continue the experiment?

Mr. HOWARD. We intend to continue the investigation under the general fund.

Mr. BEALL. That would be available in July?

Mr. HOWARD. That will be done in a small way. We would keep at it until July, but in a small way. The opinion of the Texas grain dealers and others is that it needs a more extensive investigation.

Mr. BEALL. Do you think that would be advisable?

Mr. HOWARD. I think it would be desirable.

Mr. BEALL. Do you think you could profitably spend \$10,000, or approximately that sum, between now and the 1st of July?

Mr. HOWARD. I am not sure that it can be done with profit, if you mean by "profit" results of practical value?

Mr. BEALL. I mean practical to the extent of determining whether or not this pest can be controlled.

The CHAIRMAN. You would not expect by the expenditure of any amount of money to be able to prevent any damage which the pest might do to this year's crop, would you?

Mr. HOWARD. No; it seems very doubtful.

Mr. POLLARD. It would simply be along experimental lines?

Mr. HOWARD. Yes.

Mr. BEALL. If your money was not available until after the 1st of July you would not conduct any experiments until the next crop had been infested by the "green bug?"

Mr. HOWARD. If the money were available the 1st of July, we would put men into the field and send a number of men who would be studying the conditions of this insect the whole of the next autumn and winter and the following spring.

Mr. BEALL. But your crop would then be infested by the "green bug?"

Mr. HOWARD. Yes.

Mr. BEALL. And as the result of your experiments you could not accomplish very much in the way of saving that particular crop?

Mr. HOWARD. It is doubtful.

Mr. BEALL. Just let me ask this further question. It seems to me that there is considerable conflict between entomologists themselves as to whether or not there can be an artificial introduction of this parasite. I understood your contention to be that wherever the "green bug" is found the parasite is also to be found?

Mr. HOWARD. Yes.

Mr. BEALL. What would you say of a conclusion like this which was reached by Doctor Hunter:

A serious outbreak of the "green bug" is reported from Washington, D. C., unattended by the parasite, and this at the close of July, a season most favorable for the activities of the parasite.

Mr. HOWARD. We found the parasite here at that time. I do not know how the report got out; possibly through some newspaper man here in Washington.

Mr. BEALL. He says:

The "green bug" was present in Kansas in December, 1906. During the first few weeks of April, 1907, infested wheat shipped from 28 widely separated localities throughout the wheat area of the State showed parasites present in but one place. During the same period in April an expert from the Federal Bureau of Entomology, sent here to study the situation, examined wheat fields in nine different parts of the State, and found those places free from parasites, except at one point on the southern border, where he states they are beginning to appear.

What expert was that?

Mr. HOWARD. I do not know. One of Mr. Webster's assistants; possibly Mr. Ainslee.

Mr. BEALL. Mr. Hunter further states: "These experiments showed that parasites were absent until introduced." Would you agree with that?

Mr. HOWARD. No; because he does not give any facts as to how many he counted or how close the observations were or about the condition of the weather, which we have shown is the controlling factor.

Mr. BEALL. Further he says:

Early in June, after weather favorable to both the artificial and natural distribution of the parasites, a conservative, trained observer found a large area in the northern part of the State where "green bugs" were present, but parasites, with one possible exception, were present only where introduced."

Mr. HOWARD. I should say in all probability three days later he would have found plenty of parasites there.

Mr. BEALL. This is a report covering the entire period of the infestation of the fields of Kansas?

Mr. HOWARD. Yes.

Mr. BEALL. And these are the conclusions drawn by Doctor Hunter, who is, as I understand, State entomologist for Kansas, and his conclusions are at absolute variance with the conclusions announced by you? In that state of the case, can it be said that experiments have progressed far enough for entomologists to agree upon a definite statement of what can or can not be done with reference to the extermination of the pest?

Mr. HOWARD. As a matter of fact, Mr. Marlatt tells me that immediately after those statements you are just reading were made public last year, Mr. Webster and Mr. Ainslee, of the Bureau of Entomology, went to those same fields and found the conditions radically different. That does not mean that Mr. Hunter or the people he was quoting were dishonest, but it means that as soon thereafter as our men could get there the parasites were present. As soon as the warm, bright weather comes, within a few days parasites will practically always be found.

Mr. BEALL. And in those few weeks the "green bug" may be destroyed?

Mr. HOWARD. Yes, sir.

Mr. BEALL. Have you made any other experiments along the line of means by which the "green bug" may be destroyed?

Mr. HOWARD. Yes; and you will find an account of them in the farmers' bulletin which I have just passed around; but the experiments are field experiments, such as rolling, and poisoning, and dusting, and brush dragging, which have given more or less success; but the grain grower does not want to do that sort of thing.

Mr. HAUGEN. Have you done any work on what is called the chinch bug?

Mr. HOWARD. Yes; Mr. Webster has been doing some work on the chinch bug, but we have learned something new about it. This last year he conducted observations in this territory here [presenting map].

The CHAIRMAN. Coming back just a minute to the "green bug," will you tell us how many of your entomologists have been and are now giving their entire time to the study of this insect?

Mr. HOWARD. None of them are giving their entire time to it. There have been at different times since last spring three or four men engaged in field work upon the "green bug."

The CHAIRMAN. And the man in Texas you spoke of?

Mr. HOWARD. Mr. Sanborn also.

The CHAIRMAN. He is giving it a great deal of attention?

Mr. HOWARD. He is giving it a great deal of attention; practically his entire attention.

Mr. HAUGEN. You have discovered nothing new in regard to the chinch bug by this investigation?

Mr. HOWARD. No, sir; nothing except the old-fashioned remedies, stopping the migration from the wheat to corn by means of barriers.

Mr. GILHAMS. If the weather should be very favorable in Texas this winter for the development of the "green bug," but if in the spring it should be very dry and favorable to the parasite, it would not be able to move north, would it?

Mr. HOWARD. It would do very little damage.

(At 12 o'clock m. the committee took a recess until 2 o'clock p. m.)

AFTERNOON SESSION.

The committee met at 2 o'clock p. m., Hon. Charles F. Scott (chairman) in the chair.

STATEMENT OF MR. L. O. HOWARD—Continued.

The CHAIRMAN. We will ask Doctor Howard to give us a report on the work that has been done during the past year by his Bureau in the boll-weevil investigation.

Mr. BEALL. Before you pass to that, I would like to ask one or two more questions about the "green bug." What other enemies besides the ones mentioned by you this morning are fighting the "green bug?"

Mr. HOWARD. There are a host of enemies. It would be difficult to say, offhand, how many there are, but there are several species that belong to the same family with this insect. Whenever the lice become abundant these enemies appear in very considerable

abundance, but this particular species we have been talking about is apparently the most important one, and reproduces most rapidly. There are so-called syrphus flies and ladybirds, and small ichneumon flies and other insects which prey upon them.

Mr. BEALL. I notice in the bulletin issued by Mr. Sanborn, just at the close he says that inimical insects may be artificially introduced if they are not present, so that a great deal of the grain may be saved.

Mr. HOWARD. Yes, that was his hope, and that was the hope that we had when we performed that large experiment last spring, and we have not abandoned the hope that it may be done; but under the conditions of the experiment last spring, the results seemed to show that even on a large scale the method was not effective.

Mr. BEALL. But do these parasites of which you spoke this morning feed upon anything else but the "green bug?"

Mr. HOWARD. They feed upon other plant lice.

Mr. BEALL. When the "green bug" is destroyed what becomes of these parasites?

Mr. HOWARD. They diminish in numbers, very much, without doubt; but there are always other plant lice that will carry them through the season.

Mr. BEALL. And when the "green bug" reappears the parasites multiply?

Mr. HOWARD. That is it; when the "green bug" reappears the parasites are present in small numbers and they reproduce very rapidly indeed, as rapidly as the "green bug" does itself, and perhaps even more so. Each female lays an egg in one plant louse, and she can lay many eggs; and there is an extremely rapid development, because these creatures, as was shown last year, are parthenogenetic; that is, they are able to and do reproduce from unfertilized eggs.

Mr. BEALL. Both the "green bug" and the parasite have wings and can transport themselves?

Mr. HOWARD. The parasite is winged, and the "green bug" is also winged in certain generations.

Mr. BEALL. The parasite is winged all the time?

Mr. HOWARD. Yes.

Mr. BEALL. Do they fly about the same?

Mr. HOWARD. I should think so, about the same.

The CHAIRMAN. If there are no further questions on this subject, we will ask Professor Hunter to take up the boll-weevil work.

STATEMENT OF MR. W. D. HUNTER.

Mr. HUNTER. Would it be in order to give a very brief statement about the general status of the boll weevil?

The CHAIRMAN. I think we understand pretty well what the boll weevil is, and what he has been doing, and I believe what the committee would like to hear would be a review of the work that you have done from the beginning. Tell us when you began work on the subject first, and what your methods have been, and what you have discovered.

Mr. HUNTER. Covering the whole course of the work?

The CHAIRMAN. Yes.

Mr. HUNTER. The boll weevil was discovered in this country about 1894. Some preliminary work was done immediately after it was brought to the attention of the Department. At that time it was not apparent that the insect was going to spread all over the cotton-producing area of the United States. It seemed that it might be restricted by climatic conditions to a comparatively small area down there in Texas. The matter of the control of the pest was brought to the attention of the State of Texas, but at that time the insect had invaded a very few counties, and there was a general impression among the members of the legislature that it would not continue and eventually cover all of the State. The State of Texas did, however, make provision a few years later for taking up work on the insect. That was discontinued in 1900. In March, 1901, I went to Texas on this special boll-weevil work, in pursuance of a clause in the appropriation act setting aside \$3,500 for the beginning of the investigation of the insect. Headquarters were established at Victoria, and next year Congress increased the appropriation to \$15,000, I believe, and the next Congress increased it to \$30,000, and afterwards the whole scope of the work was enlarged, until lately an appropriation of \$190,000 was made, covering not only the work of the Bureau of Entomology, but the work of the Bureau of Plant Industry in cotton improvement and demonstration of the cultural system that had been perfected by the Bureau of Entomology.

The principal accomplishment that the Bureau of Entomology points to in this work is the perfection of the so-called cultural system of control of the insect that was brought forcibly to the attention of the Secretary when he visited Texas in 1904. The Secretary visited the experimental fields of the Bureau of Entomology at Wharton and Calvert and elsewhere, and was immensely impressed with the success that was being had there in producing cotton in spite of the boll weevil. It was decided that a very important step that could be undertaken by the Department would be to spread broadcast information as to that system of control that had been perfected. On that basis the demonstration work which has been conducted with such success by Doctor Knapp was organized. Since that time the Bureau of Entomology has continued the study of the cultural system, and finds that there are many modifications of the general system that was perfected some time ago that are necessary in special regions. The insect is one that reacts very readily to climatic conditions in new regions. The habits are by no means the same in the western part of Texas, in the very dry region, where much cotton is produced, as they are in the moist valleys in east Texas and Louisiana.

That cultural system will not apply to all these conditions alike. They will undoubtedly be able to continue raising cotton in west Texas, and out there the greatest production may be expected, but in other parts of Texas large areas of land have actually been abandoned, as I mentioned to the committee last year, and my statement was corroborated by Captain Field. This cultural system includes all that is known at present about fighting the insect. It is based upon our study of the life history of the pest, and was experimented with and demonstrated by the Bureau of Entomology long before it was taken up, and attracted as much attention as it has in the past few years, the only system of control, general system, that is available now. One part of that system consists of early planting. In

connection with that recommendation we have had to determine experimentally whether early planting or late planting would be the more efficacious. Very frequently correspondents in Texas, sometimes men of considerable prominence, have argued that late planting instead of early planting would be best, that early planting serves only to breed millions of weevils. By eliminating one idea after another we have built up this cultural system.

The Bureau of Entomology has published a bulletin on the life history and habits of the boll weevil, which makes the insect probably as well known in many respects as any insect in the world. We do not consider that the work is completed on account of the continual changes in the habits of the pest, due to climatic and even geological conditions in which it is entering. The seriousness of the boll-weevil problem has caused this bulletin on the life history and habits and control of the insect to be very generally read. In all the papers of Texas, and recently in Louisiana, column after column is devoted to the boll weevil. I do not believe there was ever a similar pest which attracted so much public attention and which has been read upon so much. As a general rule the farmers are not inclined to read these more or less technical bulletins, but in the case of these publications on the boll weevil I am certain that the majority of progressive farmers have read them or read extracts from them in the daily papers.

At the same time the Bureau of Entomology has published bulletins dealing with the control of the insect and detailing the results of the experimental work. That experimental work has been carried on in such a way as to attract considerable attention. It has had some considerable demonstrational value, and the very way in which it has been conducted has assisted those publications in their influence upon the farmers. Our work has been done on the farms of reputable planters here and there, men of prominence in their communities. When farmers read about experiments conducted on this man's place or the other man's place, whose reputation is known to them, it aids in strengthening whatever statements the Department has to make.

The Bureau of Entomology has brought to a reasonable state of perfection some methods in the breeding and dissemination of parasites of the boll weevil. That is work that could not be taken up much earlier than it was started, a couple of years ago. The boll weevil in coming to this country got away from the parasites and larger agencies in control, which hold it in check in its original home. After it has been here some time, though, we find parasites of related insects, frequently those infesting common weeds along the roadside and around cotton fields, that are transferring their attack from the original host to the boll weevil, which is much more common in the cotton field. Just last year we found 6 additional kinds of these parasites that had begun to attack the weevil. We now know something over 20 different ones, and their work has amounted to the destruction of fully 30 per cent of the weevils in a field under certain conditions.

The CHAIRMAN. These are native parasites?

Mr. HUNTER. All native parasites.

The CHAIRMAN. You have not been able to introduce any from other countries?

Mr. HUNTER. No, sir; we are cooperating with the Mexican governmental commission which is working on the boll weevil and have received a great amount of material, but so far we have not found anything that takes hold in Texas. Possibly some of that failure is due to the long distances these parasites have to travel.

The CHAIRMAN. You are familiar with the work that the Mexican Government has done?

Mr. HUNTER. Yes; I have been there for conferences with their entomologists on two occasions.

The CHAIRMAN. Have you learned anything from them?

Mr. HUNTER. The conditions are so different there. Cotton is raised on such an entirely different system that I can not say that we have learned anything of practical importance up to this time, or of practical application in the United States.

The CHAIRMAN. Have they profited by any of your work?

Mr. HUNTER. They tell me that they have. They have translated and published certain of our bulletins. As I intimated, the attack against the boll weevil by these native parasites is just beginning. There are at least five or six distinct areas in the infested region where different parasites predominate. In southeast Texas we have one species and in northeast Texas we have another; that is, the distribution of these parasites is, as may be said, "spotted" over the State. One proposition upon which we have been working is the transportation of parasites from one region to another in which they do not occur. We performed last year a couple of preliminary experiments and had good results. This year we continued that work on a somewhat larger scale and transported parasites from Waco to Dallas, where we have our experimental cotton growing, and by the careful elimination of all other factors that could come into play we determined that we actually increased the yield of cotton by this introduction of parasites.

At Shreveport, in Louisiana, we established a sublaboratory and located one man there and shipped to him very large quantities of parasitized material from Texas. The season was more unfavorable for that kind of work than another one is ever likely to be, but at the same time we succeeded in starting some species of parasites there that had not previously occurred. It happened that the dryness was so great that the parasites from the drier regions gained a better foothold than those from moister regions that we expected to gain a foothold there, and which would under normal conditions. That work attracted so much attention at Shreveport from the planters that they tried to get us to move our headquarters over there, and in fact we had a petition from the Planters' Association the other day. I mention that fact to indicate that this propagation of parasites is a matter that appeals to the farmers. It is something that is not too theoretical for them. They understand the principle of the thing and realize that there is hope in the warfare against the weevil in that kind of work.

Another proposition that we are working on in connection with this parasite project is that of artificially forcing the parasites of the native weevils to transfer their attacks from the original host to the cotton-boll weevils in the fields. Experiment has been performed in cutting down weeds around cotton fields and in cotton fields that are infested by native weevils which have their native parasites,

with the idea of forcing the attack against the boll weevil. In at least two cases we have determined that that is possible; in one case at Dallas and in another case in southwest Texas. That, as Doctor Howard tells me, marks the first success in an entirely new principle in the control of injurious insects. We believe that further work on a larger scale along that line should be conducted. That is work which naturally does not appeal to an ordinary farmer, being based on principles that are but very little understood by him. It is work on which demonstrational operations could be carried on to very great advantage.

The proposition has been made at various times that the Department of Agriculture should stop the boll weevil—prevent its further spread. We are very frequently asked if we have found any way to stop the boll weevil yet. A few years ago we had an opportunity, when the insect was about to enter the State of Louisiana, to test that theory under the best and most favorable circumstances. In cooperation with the crop pest commission of that State, which was established as a result of an emergency session of the legislature, we carried on that experiment in the western part of Louisiana without success. After the guards had been sent out and the whole campaign was under way, we found suddenly that the weevil had flown over their heads, clear across the line. That is a piece of experimental work with negative result that is certainly valuable in this way, that it will prevent any other State or any other institution from attempting the same thing. At that time with the most favorable circumstances it seemed there was a chance that that might be done, but now it is apparent that there is not.

A couple of years ago the Bureau of Entomology took up a special study of the agency of cotton gins in disseminating the weevils. All the cotton that is produced, of course, at one time or another is concentrated in the gins; it all goes through the gins, and we find that many weevils are carried on that cotton through the gins and passed through them and are disseminated with the seeds. We employed a practical gin expert in connection with that work, and devised improvements in cotton-ginning machinery that have now been taken up by at least three manufacturing companies and are now being placed on the market.

In the last two years we have made a special study of the agencies in the natural control of boll weevil. We took up that study to find out exactly what these agencies were, what their relative importance was, and to find out how the farmer, by the usual operations in managing his cotton crop, could take advantage of these natural factors, and at the same time so that the farmer could avoid following those procedures that would work against and counteract the effect of the natural agencies. We made an extensive examination of the whole infested territory, and a number of men were employed on that work practically all of one season. Hundreds of thousands of infested squares and bolls were examined. In the course of that work we found that the most conspicuous factor in natural control was the heat and drying of the squares which fall to the ground. At the same time we found that that effect was much more conspicuous out between the rows where the cotton would not shade it than it was under the branches of the plant.

The practical problem that presented itself to us then was to devise some means for getting the squares from the shaded part out to the center of the row. After a number of experiments, my former principal assistant invented a machine which will do this work very well indeed. I have here a couple of photographs showing the work of this machine. We call it a chain drag. It consists of a couple of series of chains arranged in such a way that they can be dragged between the rows of the cotton plants. The chains will drag the infested squares from close to the plants out in the middle of the rows and deposit them in a narrow pathway there where they will get the full benefit of the sun. This photograph shows the machine approaching, and the next one shows how the squares have been deposited in the center. In addition to this very important effect of exposing the squares to the full effect of the sun, you will notice from those pictures an exceedingly important cultural effect.

In cotton culture the principal authorities all agree that ordinarily more harm is done by cultivation late in the season, by deep cultivation, than in any other way. The implements that are in common use now plow the ground a little deeper than it should be plowed when the plants are growing. They plow so deep that the plants begin shedding the fruit. All the people who have experimented with cotton agree that some machine should be perfected that would obviate that difficulty. This chain drag, as you notice in the picture, applies a perfect dust mulch, which fills up the cracks, so that the farmer in using that would not only be getting the effects in cultivation, filling up the cracks and destroying the small weeds, but he would also get the very important effect of the sun upon the squares. The Department of Agriculture has applied for a patent of that device, and the matter is now in the hands of the solicitor. A patent will be obtained in the name of the Department of Agriculture, so that it will not be necessary for anyone to pay royalties to any person in connection with the use of the machine. I have shown photographs and explained that machine to perhaps a score of planters in Texas and Louisiana. Everyone with whom I have talked about it has been exceedingly enthusiastic, and everyone with whom I have talked about it wants one as soon as he can get it. Of course I am not the inventor of that machine myself. It is the work of my former principal assistant, who has now become State entomologist in Alabama. I believe it is safe to say, though, that the invention is one worth millions of dollars to cotton planters, and that eventually it may be found on the great majority of cotton plantations in the south. That is the principal result of much careful, detailed, technical work to determine what are the important factors in the natural control of the weevil, and how to take advantage of them.

The Bureau of Entomology has assisted the State authorities throughout the South in quarantines that have been designed to keep out the weevil. Every one of the Southern States now has a quarantine law designed to prevent the importation of the pest. At the beginning many of those laws were ill advised and placed unnecessary hardships upon shipping interests. At one time more than 5,000 carloads of Texas oats were prevented from being shipped to South Carolina and North Carolina, where they are favorites among the farmers on account of their rust-resistant properties. South Carolina and North Carolina put on a quarantine that prevented absolutely

the shipment of Texas oats. We took the matter up through the proper channels with the State authorities and were soon able to perfect an arrangement which permitted the unrestricted shipment of oats from uninfested territory in Texas. In that way, during several years' work, I suppose we made possible the shipment of some 10,000 carloads of Texas products. At the present time the laws have been brought into more or less harmony in the different States. That is the result of meetings that have been held at the instance of the Bureau of Entomology at different places at different times, when this whole matter has been discussed and it has been shown by the Bureau of Entomology in exactly what commodities the weevil may be disseminated.

In addition to these general points, the Bureau of Entomology has printed information from time to time regarding the spread of the weevil and the exact damage done. There is a very large legitimate demand for information as to how far the weevil has spread during different seasons and exactly what damage it has done. To determine how far it spreads annually requires a considerable amount of traveling on the part of a number of men and to find out exactly what effects it has upon production also requires a good deal of expenditure in the same way. You can not find out those things altogether by correspondence with the farmers.

In addition to these points we have tested all suggested remedies that have come to our attention. At one time the State of Texas had a statute appropriating \$50,000 as a reward for the discovery of an economical remedy for the cotton-boll weevil. There was a great activity on the part of inventors in various parts of the world before that time, but, encouraged by that reward, a great many more came to the surface. We consider it a legitimate field of work to test the devices and poisons that are suggested from time to time, to determine whether they are efficacious or not. It is barely possible that some one may unexpectedly hit upon a feasible remedy or a machine; at least one that has some good points about it. Similar cases have happened before; but, at the same time, whether we find a machine or remedy with some good points about it or not, it is exceedingly important for us to have data in hand to enable us to refute the claims of unscrupulous persons who have a machine or a poison to sell. Many hundreds, perhaps three or four thousand, tests have been made to obtain this information.

The CHAIRMAN. Right on that point, did anybody ever claim this reward?

Mr. HUNTER. Yes, sir; the chairman of the committee had filed with him, I think, about 500 applications.

The CHAIRMAN. Was it ever paid to anybody?

Mr. HUNTER. No, sir.

The CHAIRMAN. So that nothing ever came of it?

Mr. HUNTER. No, sir; I think it has lapsed at this time.

The CHAIRMAN. Have you now practically covered your work?

Mr. HUNTER. Yes; in a general way.

The CHAIRMAN. Let me take you back, then, to ask you a few questions in regard to it. You say that you first developed the cultural methods as a means of warfare against the weevil?

Mr. HUNTER. Yes, sir.

The CHAIRMAN. To what extent are you working along that line now?

Mr. HUNTER. We are testing that cultural system in different localities, to determine exactly what are the weak points, due to the different conditions, either climatic conditions or plantation practice, or whatever they may be.

The CHAIRMAN. Are you testing it in cooperation with the Bureau of Plant Industry or independently?

Mr. HUNTER. Independently. Ours is experimental work strictly. It incidentally has some administrative effect, but for all practical purposes it is strictly experimental, while theirs is demonstrational.

The CHAIRMAN. What proportion of the appropriation used last year would you say was expended in this sort of work?

Mr. HUNTER. A comparatively small amount of it; say 15 per cent of it.

The CHAIRMAN. You are not using any in a demonstrational way at all?

Mr. HUNTER. No, sir.

The CHAIRMAN. How many entomologists have you had employed on this work during the past year?

Mr. HUNTER. We have ten, all told, now; nine or ten. We reduced the force on account of the reduction in the size of the appropriation. Two men were transferred to tick work, one man to tobacco work in Tennessee, and another one to white-fly work in Florida.

The CHAIRMAN. Where are those ten men employed?

Mr. HUNTER. Some of them are here in Washington at the present time, others are in Texas and Louisiana.

The CHAIRMAN. How are they employed; can you give the committee an idea of what they do?

Mr. HUNTER. They are at work at the present time arranging and tabulating the results of the whole season's work. When the season is on in Texas, every man in the force is kept very busy accumulating notes. Our work is divided into some twenty-six distinct projects. Those projects are assigned to different men, who conduct them, but one man is not restricted to any one project; one man may conduct four or five different projects and he may be assisted by all the other men in the force. It keeps them very busy throughout the season accumulating the data that is called for in our working outlines. As soon as the season closes, which is not until December, those men go to work immediately on getting their results in shape. The amount of information obtained is so large that it takes a great deal of time to get it in such shape that we can use it.

The CHAIRMAN. Do you think that the reduction in the appropriation last year materially retarded progress upon the solution of this problem?

Mr. HUNTER. It retarded progress in this way, that we were unable to set aside a reserve for use in case of the discovery of isolated outbreaks in the eastern part of the belt.

The CHAIRMAN. Were there any outbreaks that you know of?

Mr. HUNTER. Not this year.

The CHAIRMAN. So that that was merely a contingency?

Mr. HUNTER. Yes, sir.

The CHAIRMAN. What have you learned this year that we did not know last year, that is of practical value?

Mr. HUNTER. This machine that I described for one thing. That has all come up within the last six months. We know nothing about that, knew nothing that suggested it, until our immense amount of data in regard to this natural control was assembled. We learned a great deal about the propagation of parasites during the last season. We found, as I intimated, six additional species of parasites. We studied their habits. We found out the habits of a large number of weevils that we did not know anything about which have parasites that may be forced to attack the boll weevil.

The CHAIRMAN. So that your work this year has been largely along the line of studying the parasites?

Mr. HUNTER. That has been one of the important lines of work. Another line of work related to the hibernation of the boll weevil. We had large scale experiments, and the results of them have been to show exactly what a farmer may accomplish by the destruction of the plant in the field at different seasons of the year. We have determined exactly that he may accomplish three times as efficacious work by destruction in October as he may from destruction in November. We have determined, in connection with that work, the most favorable and the least favorable conditions for the hibernation of the weevil. Those are things that the farmer can take into consideration in the operations on his own place. We have determined that hibernation is different in different regions. In the Black Prairie region in Texas it is quite a different phenomenon from what it is in the timbered regions of the east. We found that even soil formation is a factor in the hibernation of the weevil, due to the temperatures on account of color and texture. It is found that in this Black Prairie region of Texas, for instance, fall destruction is not so important as it is in other regions, and that is especially important on account of the deficiency of humus in that black soil, and on that account the farmers do not like to burn up their cotton stalks.

The CHAIRMAN. They hibernate in the stalk, then, and in vegetation around them?

Mr. HUNTER. In every conceivable situation where they can get a little shelter. That whole problem of hibernation has been elucidated, we think, as a result of this large field work, and only one single outcome is going to be followed up any further. We have in preparation a bulletin which will detail fully all these results regarding the hibernation of the weevil and how control may be based upon what we have done. But there is one point that needs further investigation; that is the hibernation of the weevil in Spanish moss that hangs on the trees throughout the moister portions of the South. We find that that is a most important hibernating place for that insect, although we have no definite idea as to how we may eradicate them. Still, we want to find out how important that is and whether anything may be done to reduce the danger.

The CHAIRMAN. You told us last year, if I remember rightly, of an experiment that you expected to make in a place peculiarly well suited, I think on an island, perhaps, in a river; was that experiment conducted under your direction?

Mr. HUNTER. Yes, sir; I suppose you refer to a large experiment in the destruction of stalks at Olivia, on the coast of Texas.

The CHAIRMAN. Yes.

Mr. HUNTER. The results of that work were not obtained until a few weeks ago. That is, we did not have the final records concerning the yield of cotton, which gave information as to the exact results of the experiment. That is an experiment that went over two fiscal years. As you recall, undoubtedly, we had 410 acres of cotton destroyed in October, no other cotton within 12 miles, with the idea of finding out exactly how much could be accomplished under the most favorable conditions by early fall destruction of the plants. That was a year ago in October. This season we carried on observations there; a man visited that locality once every six weeks, or such a matter. Up until May he was unable to find any weevils whatever in the cotton growing there. The farmers, in the meantime, had been given permission to plant their cotton at the usual time and to manage it in whatever way they liked. Until May we were unable to find any weevils there at all, and supposed that the insects might have been exterminated altogether. But in June a few weevils were found, at first only one, but they multiplied, so that by October they were injuring all of the cotton forms as they were put on the plants. As against that experimental area we had a check on the opposite side of the bay, some 25 miles away, where the farmers had left their stalks standing all winter and where cotton was planted again this last spring. We made observations to check the results of the experimental operations 25 miles away. We found, as a result of the work, that the crop in the experimental area was nearly twice as large as that in the check area. The difference in the yield between the experimental area and the check area would practically pay for the land upon which the experiment was conducted.

Mr. POLLARD. Were the same methods employed in each case?

Mr. HUNTER. No, sir.

The CHAIRMAN. Then how much of the difference in the results do you attribute to the destruction of the boll weevil by your fall burning?

Mr. HUNTER. All of it.

The CHAIRMAN. You think there was not enough difference in the methods of culture or the kind of seed used?

Mr. HUNTER. There was no difference, absolutely no difference, in the kind of seed that we have used or in the cultural processes. Even if there were, that would be offset by a great difference in the quality of the land. The experimental area was on recently formed sandy soil, within a few hundred yards of the Gulf, a very poor sandy soil, indeed; while the check area was on soil in a river bottom there, black soil, that was very rich. The difference in the quality of the soil was shown very conspicuously by the size of the plants; on the check area they grow twice as high as on the area where they were destroyed.

The CHAIRMAN. Why do you reach the conclusion that you get better results by destroying the stalks in October instead of November?

Mr. HUNTER. Because we have built cages over considerable areas of cotton and in different compartments in those cages we have destroyed the stalk at different dates, beginning in September and running through into December. We find, for instance, that destruction early in October last has resulted in the survival of only 2 per

cent of the weevils, while destruction in late October resulted in the survival of 14 or 15 per cent.

The CHAIRMAN. What was the cause of that difference?

Mr. HUNTER. The lengthening of the hibernating period. The winter season is the most disastrous one for the weevil. It is pretty hard for any weevils to get through the winter season, and on one or two occasions the infested area has shrunk because on the outskirts the weevils did not survive.

The CHAIRMAN. I should think that fact would rather lead to expect that there would be better results obtained in the destruction in November than in October.

Mr. HUNTER. That would simply shorten the period of hibernation, while early destruction lengthens it.

Mr. COCKS. The weevils have gone elsewhere; that is, there are more weevils on the cotton stalk that could be destroyed in September than there are that could be destroyed in October.

Mr. HUNTER. That is one point, and, moreover, the destruction early in the season prevents the multiplication of the fall broods; these insects keep on breeding.

The CHAIRMAN. That is the point.

Mr. HUNTER. The cotton plant puts on food and enables the weevils to breed until December, and it is those late developed broods that furnish the weevils that grow during the winter.

The CHAIRMAN. One would think that a total destruction of the stalks would destroy an equal number of the weevils in one condition or in the other. Whether they are hibernating or active they must be destroyed when the stalks are destroyed, must they not?

Mr. HUNTER. A great share of them; those that happen to be in the field.

The CHAIRMAN. Has your study of the change of habits of the weevil as it becomes accustomed to a different climate, to which you refer, contributed in any way to the success of your warfare?

Mr. HUNTER. Not to the success of the warfare, but it has given us some light that points out the weaknesses of the present system. The weevil has apparently succeeded in adapting itself to the conditions in the Red River Valley, and the Mississippi Valley proper, in such a way that the ordinary system of control that was efficacious in Texas will not help much.

The CHAIRMAN. As a conclusion, then, of the whole matter, your judgment now is that the best results which have been obtained thus far come from the development of cultural methods?

Mr. HUNTER. Yes, sir.

The CHAIRMAN. And, aside from that, you look for results from the importation of parasites?

Mr. HUNTER. Yes, sir; from the general use of this chain drag and from the use of at least one other device that we are experimenting on now.

The CHAIRMAN. What is that expected to accomplish?

Mr. HUNTER. That is a device for killing the plants without plowing them up and burning them. On account of the shortage of labor throughout the South the majority of the farmers, we find, can not pick out their cotton from the plants early enough in the season so that they will be able to destroy their plants as early as they ought to be destroyed. The labor is so scarce that the available supply

has to be spread out over some of the winter months. The farmer simply can not get his cotton picked out in time to destroy the insects in October, say. We have therefore worked along the line of accomplishing the same results as follow from fall destruction in another way. This machine that we are experimenting on, the caveat of which has been turned over to us by the inventor, a Louisiana planter, is designed to cut the stalk of the plants some inches below the ground. It is an instrument on the principle of a disk plow, a revolving disk going into the ground at an angle of about forty-five degrees, cutting the roots and leaving the plants standing. If that machine can be made successful, by running it through the fields the plants will be left standing but killed, and they will remain there so that the farmer can continue picking indefinitely. In that way the development of these fall broods of the weevil will be prevented. It will not accomplish all the effects of the fall destruction that we recommend now, but will accomplish some or many of those effects.

Mr. POLLARD. Do you expect that the plants all having been killed, the weevil can not reproduce in the dead plants?

Mr. HUNTER. Exactly.

Mr. POLLARD. Is that the object which you seek to determine when you use this chain drag, when the bolls are pulled into the center of the rows and allowed to remain in the hot sun, when the hot sun kills the wood, takes the moisture out of the wood, and in that way you kill the weevil?

Mr. HUNTER. Yes; the hot sun dries up the squares in which the weevil may be and destroys the food.

Mr. POLLARD. So that the egg does not hatch?

Mr. HUNTER. Yes.

The CHAIRMAN. Have you had any good results from spraying of any sort?

Mr. HUNTER. No, sir. We have tried any number of sprays that have been suggested. The difficulty in spraying for the weevil is that it works inside of the fruit of the plant in all stages except one. At the present time we have under way a project that we will be able to work out next season, perhaps, in spraying for an entirely different purpose. We received the suggestion from the work that is done in destroying the water hyacinth in the streams and bayous of the South, that the cotton plant might be killed absolutely in the field by an economical spray. I think it is iron sulphate that is used in clearing the bayous of this water hyacinth. Possibly means may be devised for spraying cotton fields with enough of that preparation to kill the plants left standing, so that picking may go on indefinitely. In that way, by chemical means, we may be able to accomplish all we hope to accomplish by this purpose.

Mr. BEALL. Do you think that device for cutting the roots would be practicable to use in the cotton fields?

Mr. HUNTER. In many cases it would be.

Mr. BEALL. Does not cotton continue to mature, say, to about the middle of October?

Mr. HUNTER. Yes, sir.

Mr. BEALL. At that time the fields are filled usually with open cotton?

Mr. HUNTER. Yes, sir.

Mr. BEALL. Now, to go into cotton fields in that condition with that kind of a device, drawn by horses, would not the result be to destroy a great part of the cotton that has opened?

Mr. HUNTER. It would knock a good deal of the cotton to the ground, but by October, in your country, for instance, the cotton has been gone over two or three times and picked out.

Mr. BEALL. Sometimes. Take 1906, for example. In the middle of October a great deal of cotton that year had not been picked at all because of the scarcity of labor; the picking continued during all the winter.

Mr. HUNTER. But at the same time during a normal season in Ellis County, say, the cotton is picked over once very near the 1st of October.

Mr. BEALL. Yes, sir.

Mr. HUNTER. Suppose this machine should be run through the cotton field immediately after the first picking, after the plants were cleaned as a result of the first picking.

Mr. BEALL. Would not that prevent the maturing of a considerable amount of cotton? As a general proposition it is claimed there that a bloom of cotton that appears by the middle of September has a fair chance of opening.

Mr. HUNTER. That is a very good old plantation rule, but it is another illustration of those rules that do not apply under boll-weevil conditions. A bloom that opens at that time of year in a weevil-infested area has no chance of developing into a boll.

The CHAIRMAN. You said that the State of Texas took up this matter along in 1894 or 1895, but gave it up about 1900. Did they abandon it because they thought it was hopeless or because they thought no further work was necessary?

Mr. HUNTER. They abandoned it for a complication of reasons. I think one reason was they were dissatisfied with the progress that had been made; they gave it up partly as the result of a régime of economy in the legislature down there and partly as a result of their offering this reward. They wanted to substitute this offer of reward for all the work that was being done.

The CHAIRMAN. Is anybody else doing work along the entomology side of the problem now except your Bureau?

Mr. HUNTER. Yes, sir. The crop pest commission of Louisiana is doing a good deal of work. That commission has a number of other lines of work to undertake, but has a couple of men detailed on boll-weevil work. The weevil has now practically covered the State of Louisiana, and has gone over into the State of Mississippi. In Mississippi they have an entomologist who is doing what he can, but his department is poorly equipped. In Alabama my former principal assistant has just been made entomologist. He is studying the conditions over there by the use of a part of the Adams appropriation for that institution.

The CHAIRMAN. Then Louisiana, Alabama, and Mississippi are the only States that are doing any work?

Mr. HUNTER. Strictly entomological work. The other States all have quarantines and the entomologists in all the States are concerned with the enforcement of those quarantine regulations and have posted themselves on boll weevil conditions in order that

they may advise people in their States. Most of them have been to our headquarters at Dallas to study the actual state of affairs there.

The CHAIRMAN. Do you think the establishment of quarantines has had any effect in delaying or preventing the spread of the weevil?

Mr. HUNTER. I think the establishment of these quarantines has had a great deal to do with the delaying of these outbreaks. If it were not for these quarantines, there would be a large number of the weevils in South Carolina, Georgia, and possibly elsewhere.

The CHAIRMAN. You know this appropriation was put in the bill and has thus far been carried as an emergency?

Mr. HUNTER. Yes, sir.

The CHAIRMAN. Can you see far enough ahead to give us an idea of how much longer the emergency will continue, so far as it relates to your bureau?

Mr. HUNTER. The weevil will cover pretty near all of the cotton belt in five years, but the greatest emergency that is likely to occur is just about to take place, we believe, in the invasion of the Mississippi Valley proper by the weevil, where the cultural expedients will not have the same effects that they have had in Texas.

The CHAIRMAN. Why will they not have the same effect they have had in Texas?

Mr. HUNTER. On account of the greater humidity; on account of the more favorable hibernating quarters for the weevil. A much larger percentage of weevils would go through every winter and attack the plants the next spring.

The CHAIRMAN. Can you name the cotton States which have not yet been infected?

Mr. HUNTER. If it would serve your purpose, it would be easier for me to name the States that have been infected—Texas, Louisiana, Mississippi, Arkansas, and Oklahoma. I have a map here that shows that graphically.

The CHAIRMAN. Are there any further questions any member of the committee desires to ask in relation to this matter?

Mr. WEEKS. Mr. Chairman, I want to ask the Doctor how much of an appropriation was made by the State of Louisiana for the suppression of the boll weevil?

Mr. HUNTER. Fifty thousand dollars.

Mr. WEEKS. Is that annual?

Mr. HUNTER. No; it runs until it is expended.

Mr. WEEKS. How long has that been made?

Mr. HUNTER. It was made two years ago.

Mr. WEEKS. How much has been spent, do you know?

Mr. HUNTER. All, except \$4,000 or \$5,000, or some such a matter.

Mr. McLAUGHLIN. How much of an appropriation is made by Texas?

Mr. HUNTER. Altogether I think they have appropriated \$30,000 or \$40,000. In addition they had this appropriation of a reward of \$50,000 up for several years, but it has now been withdrawn.

Mr. WEEKS. Have the counties or townships or any of the associations spent money in a systematic way?

Mr. HUNTER. Yes, sir.

Mr. WEEKS. In cooperation with you?

Mr. HUNTER. Yes, sir; they have had boll weevil conventions in the city of Dallas. They had three annual boll weevil conventions

and perfected a permanent organization and a bureau of information. They published, at their own expense, concise statements of our bulletins and recommendations. They assisted the planters in getting the seed of the early maturing varieties of cotton.

Mr. BEALL. Is it not a fact that there has been a great development all along the line in Texas in the matters that you suggested?

Mr. HUNTER. Undoubtedly.

Mr. BEALL. A complete revolution during the past five or six years upon the question of seed selection, and is it not a fact that formerly there was no attention paid to the quality of seeds that they would plant?

Mr. HUNTER. That is so.

Mr. BEALL. And is it not a fact that the seeds of the planters are very carefully selected now?

Mr. HUNTER. In general, it is.

Mr. BEALL. In the cultural methods, to what extent have your recommendations been adopted?

Mr. HUNTER. Generally to a large extent. Farmers here and there have adopted the recommendations in part and others entirely. This one recommendation of fall destruction has not been adopted anywhere near as thoroughly as it should, but the other recommendations about early planting, the use of the early maturing varieties, thorough cultivation, picking the squares from the ground under certain conditions, have all been taken up either in toto or more or less by farmers.

Mr. BEALL. Suppose that the farmers in this boll-weevil region were now planting, farming, and cultivating their crops as they were at the time your attention was first directed to it.

Mr. HUNTER. Yes, sir.

Mr. BEALL. How would the percentage of the crops raised under those conditions compare with what is actually being raised?

Mr. HUNTER. Texas will produce about 2,000,000 bales of cotton this year—two millions and a third. I should say that under the conditions you mention you would be producing perhaps 1,000,000 bales.

Mr. BEALL. At what rate is this pest progressing?

Mr. HUNTER. About 50 miles a year.

Mr. BEALL. And in the course of a few years you expect that it will cover the entire cotton region?

Mr. HUNTER. Yes, sir.

Mr. BEALL. I wish you would go a little further into detail, and explain why the same methods that have proven successful in preventing the pest in Texas would not be applicable under conditions in, say, the Delta of the Mississippi and the low lands of Louisiana.

Mr. HUNTER. In the first place, those fields in Mississippi and Louisiana have been cleared from dense forests; the cotton fields are set among the trees covered with moss. The weevils, consequently, have ideal conditions for hibernating. A much larger percentage will go through the winter to attack the crop of the next season than in the black prairie region in Texas, for instance. Every season the farmer there will start out with more weevils an acre than the average farmer in Texas has.

Mr. BEALL. That is true in the heavily timbered regions?

Mr. HUNTER. Yes, sir.

Mr. BEALL. As compared with the prairie region?

Mr. HUNTER. Yes, sir. Then when the farmer plants his cotton, he will find that, no matter what kind of varieties he plants, before very late in the season he will have the whole ground shaded by the limbs that grow out in that very moist, rich country. Cotton will shade the ground completely, even if the plants are put 6 feet apart. In the valley lands of Mississippi and Louisiana they will shade the whole surface.

Mr. BEALL. The plant grows so much ranker in that character of soil than out on the prairie lands of Texas?

Mr. HUNTER. Yes, sir; so that will reduce the effect from the sun, which is so very important in Texas.

Mr. BEALL. Will not your problem in Mississippi and Louisiana, in the bottom lands, be even a much more difficult problem than it has been in Texas?

Mr. HUNTER. Much more difficult, undoubtedly.

Mr. BEALL. And as an emergency, so far as saving the cotton crops of those States, that is greater than it was to save the cotton crop of Texas?

Mr. HUNTER. Much greater, undoubtedly.

The CHAIRMAN. We will take up the work that has been done in the prevention of the spread of moths.

STATEMENT OF MR. L. O. HOWARD, CHIEF OF THE BUREAU OF ENTOMOLOGY, DEPARTMENT OF AGRICULTURE.

Mr. HOWARD. You will remember, Mr. Chairman, that you appropriated, two years ago, \$82,500 and last year \$150,000 to prevent the spread of the gipsy moth and brown-tail moth in New England. The \$82,000 was spent last year, and we are spending the \$150,000 now, and Congressman Roberts has introduced a bill asking you for \$100,000 in addition to the \$150,000 which the Secretary of Agriculture has asked for this year, under the head of an emergency appropriation. The reasons that induced Congressman Roberts and the delegation from the New England States, who visited you yesterday afternoon to ask for this additional appropriation are, in brief, that the work of the Department of Agriculture has been so thorough and so successful as to command their confidence and respect during the last year or year and a half.

The question was asked after these gentlemen left your session yesterday morning by a gentleman from New Hampshire, "If you get an appropriation next year, how much is New Hampshire going to get?" I replied to him, and this reply will give you the policy of the Department in this matter, that "If it seems to the best interests of the country at large in this work that New Hampshire should have the whole sum, it will all be spent in that State; if it seems to the best interests at large that Massachusetts should have the whole, it will all be spent in the State of Massachusetts." We have found that in Maine and New Hampshire, in Rhode Island and Connecticut the conditions are such as to possibly allow the extermination of the gipsy moth. Therefore we have said to these men: "You have appropriations from your States; we will find out for you where these colonies exist; we will send our strong parties of scouts into your States, and we will locate every place, and then you go in and we will lend you a few men to teach your men how to do the work. If you find that you can not exterminate the pests,

then perhaps the Government of the United States will be willing to help you out." But the main part of our money ought to be expended to prevent the spread in the only logical way, which is to go to the main centers of distribution and clear up either side of the roads so that there will be no chance for the gipsy moth caterpillars to fall upon trolley cars, automobiles, carriages, or other vehicles, and thus be carried for great distances.

Mr. Kirkland spoke to you yesterday of their having found this fall outlying colonies beyond the boundaries thought to exist at the time this appropriation was made, and I could not help thinking that this thought came into your minds, that the appropriation had been made to prevent the spread of the insects, and yet they were spreading. Mr. Kirkland did not say that these were colonies that had been formed within the last year or two years, and in reality they were new findings of colonies that had existed from a time previous to the starting of this work. The State of Massachusetts, as much money as it has spent in the investigation of this problem, has not yet reached a complete boundary limit. For example, the spread was found this winter to have occurred as far as Springfield, Mass. That is beyond any point where they had previously been found, and that Springfield invasion was from the occurrence of an old nest which could be easily recognized. From its condition that colony must have started at least two years ago. Some automobile coming from Boston and going straight to New York passed through Springfield, and along the road the caterpillars, two or three, perhaps dropped on the automobile going along the State road through Massachusetts, and as the automobile stopped in Springfield these caterpillars crawled out, laid their eggs, and started a little colony in Springfield.

The scouting this year has been so careful that I think we understand exactly where the insect is. This year we have been spending the money exactly that way. We have had 40 men in Maine since the leaves fell from the trees. You can not begin scouting with the best success until the leaves do fall. Forty men have been in the State of Maine scouting from the time the leaves fell up to the time of the first snow. After the very heavy snows fall scouting is difficult, because egg masses are in the rocks, in the interstices in stone fences, in every possible nook. So after the heavy snow falls the scouting is difficult.

In New Hampshire we have had 30 men. We have had a crew of men in Rhode Island and we have had several in Connecticut. The Connecticut outbreak is a very simple one. The infested area is in the vicinity of Stonington and is limited to 1 square mile. The main work has been done in Massachusetts. We have taken all of the roads leading through Malden, Melrose, Wakefield, Waltham, and a great many other cities, the main roads over which automobiles and carriages and other vehicles are constantly passing; we have cleaned up all the underbrush on either side of the road; we have sprayed the trees at the time the younger caterpillars were coming out. This clearing out of the shrubbery a hundred feet back on either side of the road has made conditions exist there so that it has been impossible for any caterpillars to fall from any tree on the road or onto any passing vehicle. The labor has been ordinary laboring work, and the men engaged have been laboring men, at \$1.50 or \$2 a day.

The CHAIRMAN. Under whose direction was that done?

Mr. HOWARD. That was done by the United States Government.

The CHAIRMAN. Paid by the United States?

Mr. HOWARD. Yes; from a fund of \$150,000 appropriated specifically to prevent the spread of moths.

Mr. HAWLEY. Do those gypsy moths ever attack evergreens?

Mr. HOWARD. Yes, sir; they are especially destructive to evergreens.

Mr. HAWLEY. And if not checked would they extend and spread over the whole United States?

Mr. HOWARD. That is what we fear.

Mr. HAWLEY. They would thrive, you think, in every section?

Mr. HOWARD. I can see nothing to prevent it.

Mr. McLAUGHLIN. That would seem to me a far departure for expert work to paid for by the General Government. It would look as if the people of a State like Massachusetts might do that kind of work themselves.

Mr. HOWARD. The work has to be done under men acquainted with the life history of the insect.

Mr. McLAUGHLIN. Under the men trained, yes; but the actual, manual work, it seems to me, might be done by common laborers gathered right in the place.

Mr. HOWARD. Yes; it could be done, and the burden assumed by the State of Massachusetts, for example, as Mr. McLaughlin says; yet she has, since 1905, appropriated nearly a million dollars out of her own State treasury.

Mr. McLAUGHLIN. How was that money expended?

Mr. HOWARD. That money was expended in reimbursing towns for work that they had done in similar operations—caring for shade trees, caring for orchards, and caring for woodlands.

Mr. WEEKS. While Doctor Howard is on the subject of the appropriations made by Massachusetts, I would like to submit a copy of what has been appropriated by the State, sent me by the State auditor, which says that \$1,666,634.29 have been appropriated and spent by the State alone since 1890, and nearly all of that since 1895.

Mr. HOWARD. Nineteen five?

Mr. WEEKS. No; since 1895; and last year about \$300,000 was appropriated by the State and spent.

(The table referred to is as follows:)

The following figures represent the expenditures in connection with the suppression and extermination of the gypsy moth and the brown-tail moth, to wit:

GYPSY AND BROWN-TAIL MOTH SUPPRESSION.

| | |
|-----------|-------------------------|
| 1890..... | \$25, 539. 32 |
| 1891..... | 69, 497. 82 |
| 1892..... | 75, 226. 43 |
| 1893..... | 74, 991. 74 |
| 1894..... | 112, 591. 21 |
| 1895..... | 130, 791. 93 |
| 1896..... | 129, 779. 26 |
| 1897..... | 154, 100. 60 |
| 1898..... | 186, 520. 24 |
| 1899..... | 199, 726. 57 |
| 1900..... | 18, 719. 42 |
| 1901..... | 786. 29 |
| 1905..... | 43, 801. 86 |
| 1906..... | 121, 487. 62 |
| 1907..... | 272, 255. 60 |
| | <hr/> \$1, 615, 815. 91 |

BROWN-TAIL MOTH.

| | | |
|-----------|------------|-------------|
| 1898..... | \$9,948.96 | |
| 1899..... | 6,063.72 | \$16,012.68 |

GYPSY AND BROWN-TAIL MOTH PARASITES.

| | | |
|------------|------------|--------------|
| 1905..... | \$2,105.09 | |
| 1906..... | 10,293.35 | |
| 1907..... | 22,407.26 | 34,805.70 |
| Total..... | | 1,666,634.29 |

The CHAIRMAN. Right in that connection, so as to get it into the record at the same place, has there been money appropriated by towns or communities in addition to the sums the particular individuals have spent?

Mr. WEEKS. A large amount, it being stated that it was estimated that \$750,000 had been spent by Massachusetts State towns or individuals.

Mr. POLLARD. Was that everybody?

Mr. WEEKS. Including the State appropriation, and that all told \$750,000 was spent there by the State itself in one year. I can just say, as an illustration to the committee, that the moth has spread into the city where I live. I own a place that has about 4 acres. Two acres of it are in shade trees, and I spent nearly \$200 on my own place last year to try to get rid of the moths in those 2 acres of trees.

Mr. McLAUGHLIN. I understand that a large part of this State appropriation was for the purpose of reimbursing the individuals of villages that had suffered loss from the depredation?

Mr. WEEKS. No, not at all; not a cent of it.

Mr. HOWARD. I used the word "reimbursement," but I meant reimbursement for a certain proportion of the money they had expended in the year, not for the loss.

Mr. WEEKS. Not to make good the loss they had sustained?

Mr. HOWARD. No, sir.

The CHAIRMAN. Are we to infer from what Mr. Weeks has just said that it costs something like \$100 an acre to exterminate these moths from forests?

Mr. WEEKS. That is what it cost me on my place last year, and within a few days I have had a bill of \$50 more. The moths are off the trees, but the men are going over the trees again, and that has nothing to do with the highways or with the forest lands, or large sections that are not controlled by people who can take care of their own places.

The CHAIRMAN. I understand from what Doctor Howard says that these egg masses are likely to appear not only on the trunks of trees and on their branches but on fallen logs and in stone fences?

Mr. HOWARD. And the sides of houses.

The CHAIRMAN. And the sides of houses and, perhaps, in more obscure places. Does it not seem to be a practically hopeless task to explore the forests of Maine, for example, with such particularity as that statement would seem to make necessary?

Mr. HOWARD. We have practically shown that they have not reached to the forests of Maine. It is difficult for them to get into

the forests, for the reason that vehicles carrying them do not go into the forests. The moth does not fly; it has to be carried by some person or conveyed by some method, so that they do not get into the forest except by a very gradual spread, and we can stop them, I hope, before they get in. Mr. McLaughlin's question reminds me to bring out this point, why should we do this for Massachusetts and kill the insects on their trees? It is simply for this reason—to protect the rest of the country. We are not clearing up the trees in their gardens; we are simply clearing out the roads so that these insects will not be carried to Vermont or Maine or the other States. Looking at it from that point of view, it is a good national measure; we are protecting the rest of the country.

The CHAIRMAN. Has the progress made encouraged you to believe that if the work is continued we may eventually exterminate the moth?

Mr. HOWARD. I feel very sure that we can prevent the further spread of the moth to an appreciable degree until such time, at least, as the parasites that we are now trying to introduce from Europe have had a very good chance to take hold and bring them into subjection.

The CHAIRMAN. Will you tell us what progress you have made in the way of introducing parasites?

Mr. HOWARD. I hardly like to leave this question, but I will. Congress three years ago appropriated the small sum of \$2,500 to enable me to look into the question of the importation of European parasites. They increase here in a way that has not before been the case in their own countries and we have known all the while that there were parasites there that would feed on the gipsy moth and the brown-tail moth and hold those creatures in a measurable subjection in their own home. The moths are not of first-class importance. They will occasionally do a little damage and eat leaves, but they never kill trees.

Mr. HAWLEY. Are any of these parasites harmful?

Mr. HOWARD. Not in the least. They lay their eggs and feed only upon hairy caterpillars.

Mr. HAWLEY. They are welcome to them.

Mr. HOWARD. So, three years ago, on the strength of this small appropriation, I went over there and organized a service, in which all the European official entomologists joined very cordially, to have European parasites sent over to Boston and kept in a laboratory until they were in a condition to be liberated. That service has grown, and I have taken three trips for the purpose of seeing that the thing was done properly, and during these three years we have had, for example, the winter nests of the brown-tail moths brought over by the hundreds of thousands from Europe, and we have bred from those nests some hundreds of thousands of parasites of different species. Some of those we have been obliged to take into the laboratory and breed for a while and then turn them out, selecting portions of the woodland where the gipsy moth or the brown-tail moth occur which would not be locally treated during the course of the State work.

Mr. McLAUGHLIN. How do you turn them out and apply them to the moths?

Mr. HOWARD. We have a series of 75 or 80 large cages—rectangular boxes—in the laboratory, with glass tubes sticking out toward the light—round glass tubes. We put the nests coming from Europe into these boxes in the spring. The parasites issuing from the nests, seeking light, come out into these glass tubes. Then an expert assistant examines them. He selects those which are known to be primary parasites and destroys the secondary parasites—that is, parasites of parasites; then he takes the tube out and puts them into a cage where there are caterpillars of the brown-tail moth hatched in this country. They lay their eggs, and then when the adults come out they are taken into the woods, and they fly out.

Mr. HAWLEY. The parasite flies?

Mr. HOWARD. Yes. During the summer time from all parts of Europe there are coming in every mail boxes of caterpillars in different stages of the gypsy moth; from south Russia, from north Germany, from Servia, from Brittany (in France) these boxes are coming with the caterpillars in different stages of development. They are put into the laboratory; the parasites are bred out. If they are in small numbers, they are bred in cages, but if there are many they are liberated. The result has been that, due to the very generous assistance of the European entomologists, with the expenditure of a comparatively small amount of money, we have brought over here 40 of these European species of parasites, and we are perfectly sure that some of them have become acclimated and are working. The probabilities are that others have, but it is a very difficult thing to find out. We can not with ease go into the woods and find these minute creatures. The only way we can find out whether an experiment has been a success or not is to watch to see any sensible depreciation in the number of the moths.

The CHAIRMAN. Do these parasites attack the caterpillar?

Mr. HOWARD. Yes; they attack the caterpillar. We have also three species that breed in the egg. We have two that breed in the chrysalis. All of these parasites attack both these pests—the gypsy moth and the brown-tail moth.

The CHAIRMAN. The gypsy moth and the brown-tail moth operate over the same country?

Mr. HOWARD. Yes; they operate over the same country, except that the brown-tail moth has a wider distribution. It is a winged species and has gone farther up the Maine coast.

The CHAIRMAN. Is it as destructive a pest?

Mr. HOWARD. No; it is not as dangerous an insect. It does not begin to be as dangerous an insect in the woodland; it is principally an orchard pest, and it is greatly feared by the people in the White Mountains and along the Maine coast. They are fearing it more than they do the gypsy moth, for the reason that it interferes with the summer tourists.

Mr. HAWLEY. Do they attack the tourists?

Mr. HOWARD. They do, really. The brown-tail moth has barbed hairs which float around in the air and get in the sweat pores and produce an intense irritation, and the summer tourists will not go where the brown-tail moth is to be found. In regard to the whole subject, Mr. Chairman, the work has been extremely successful. Those people who went through New England three years ago and went through it again last summer must have been struck with the

extraordinary change of affairs as regards the foliage on the trees. In the country about Boston and out toward Cape Cod and up toward Manchester, the whole country is practically free from these insects, whereas it was a scene of desolation three summers ago. The work has been so effective that it seems to me that it is well worth while to continue the appropriation at least another year, and let us see whether this parasite importation will not hold the thing practically in check.

Mr. HAWLEY. I was going to inquire if you thought it would be advisable to make a little more money available for the importation of the parasites and spread it over a larger area up there?

Mr. HOWARD. The parasite work is going on very successfully. Congress has only paid the expenses of the first year. Since then I have been acting as the representative of the State of Massachusetts, and under funds given me by them; they have been very courteous in the way they have handled the affair. For example, starting out last spring to open up new stations in southern Russia, the governor ordered that \$1,000 be given to me in advance for expenses, so that I would not be troubled by financial matters on the trip. That is something Uncle Sam never did for anybody.

Mr. HAWLEY. I was thinking that by putting these parasites out where the moth was then operating—as we used to back fire in the forests—that you might prevent its being spread.

Mr. HOWARD. That is exactly what I am going to do this year.

The CHAIRMAN. It is your opinion that the work can be very satisfactorily carried forward another year with the same appropriation that you had last year?

Mr. HOWARD. We can do a great deal of good, but we can do much more good with an additional hundred thousand.

The CHAIRMAN. That is not essential, is it, to the ultimate conquest?

Mr. HOWARD. No; I hardly think it is, but the work could be brought to a quicker conclusion, and could be done more effectively with more money.

Mr. WEEKS. Assuming that the Government would, in the next three years, appropriate half a million dollars for this purpose, do you think it would have any effect on eradicating this pest if it were appropriated in the next year or two rather than divide it up over three years?

Mr. HOWARD. I do not believe, Mr. Weeks, that it is possible to exterminate either of the insects.

Mr. WEEKS. Entirely?

Mr. HOWARD. I think the State of Massachusetts had it in its power in 1899 to exterminate the insect.

Mr. POLLARD. Then I understand from your statement that it is your idea to prosecute this work of scouting and preventing the spread of the pest as much as possible and, in the meantime, carry forward your work with as much expedition as possible in introducing parasites, and your hope of the solution of the problem is ultimately through the parasites rather than the physical destruction of the pest?

Mr. HOWARD. Quite right. But even if we do get all these parasites over here and get them established, it must be understood that that does not mean the extermination of the insects.

Mr. POLLARD. Do you think that this committee of Congress should authorize a larger expenditure of money for the parasite work than they have for the present fiscal year?

Mr. HOWARD. I do not think that that is necessary. The State of Massachusetts has \$10,000 appropriated for that purpose, and that will be ample to carry it on on the largest scale that is practicable.

The CHAIRMAN. If there is nothing further, I would like to ask Doctor Howard if he is doing any work on the Texas cattle tick?

Mr. HOWARD. That work is all being done under Mr. Hunter.

The CHAIRMAN. I mean your Bureau.

Mr. HOWARD. Yes; our Bureau.

The CHAIRMAN. Your Bureau has been doing some of the work along with the Bureau of Animal Industry?

Mr. HOWARD. We have been doing some very important work on the life history of the cattle tick and allied ticks. The Bureau of Animal Industry has been carrying on these very large measures of tick extermination.

The CHAIRMAN. A part of that emergency appropriation of \$150,000 has been expended by your Bureau?

Mr. HOWARD. No, sir; that has all been expended by the Bureau of Animal Industry. I have used some of the funds from the miscellaneous insect investigation appropriation. I have used some of the funds in that appropriation for work on the life history of the cattle tick.

The CHAIRMAN. You really have not been cooperating, in the ordinary sense, with the Bureau of Animal Industry in this matter?

Mr. HOWARD. Only through the fact that it was done with the full understanding with them that we were doing this work, and they were glad to have us do it.

The CHAIRMAN. Could you state to us, in about five minutes, what results you have obtained in the work you have been doing?

Mr. HOWARD. I would rather have Mr. Hunter do that.

STATEMENT OF MR. W. D. HUNTER, OF THE BUREAU OF ENTOMOLOGY, DEPARTMENT OF AGRICULTURE.

Mr. HUNTER. Mr. Chairman, the cattle tick that is being eradicated in pursuance of the appropriation of Congress has never been worked upon to amount to very much in this country. Such things as the variation in its life's history and habits due to difference in location have never been investigated at all. About ten years ago, or longer than that, some work was done by the Texas station. More recently Prof. H. A. Morgan, now director of the Tennessee station, did some work in Louisiana, and later in Tennessee. With those two exceptions virtually no work has been done to elucidate the life history and habits of this creature. In other words, the appropriation for the eradication of the tick is being expended, and expended wisely and effectively, undoubtedly, while the Bureau of Entomology has set aside a small portion of its regular appropriation in studies designed to bring to light better means of control and eradication than are known.

The work of the Bureau of Animal Industry is strictly repressive, and ours is designed to bring to light more and more effective means. We have worked along the line, in general, of obtaining data that can

be used in the pasture eradication system that was perfected by Professor Morgan. It has been found that by rotating cattle from one field to another and from there to another, possibly, that the tick can be gotten rid of altogether. It is not necessary to spray the animals, or dip them, or grease them, or anything of that kind. The farmer can so arrange his property that he can leave his cattle in one field for a certain number of months and then move them to another field and then to a third, and after a certain length of time the first field will be free of ticks. Since these creatures have no other hosts than cattle and a few other animals, that is a system that can be put into operation by the small farmer anywhere throughout the South. It could also be put into operation by the ranchers on a large scale in many cases.

Mr. HAWLEY. How do the ticks spread from one place to another?

Mr. HUNTER. The female tick, when it becomes engorged, drops to the ground and deposits six or eight thousand eggs, and these eggs, or minute ticks—seed ticks, so called—crawl to a blade of grass and remain there, in some cases for five or six months, absolutely without food. They have to stay there until some animal comes along and brushes them off. They are spread to some extent through water courses. Floods will cause the dissemination of them. That is one point in relation to the life history of the tick that we have worked on considerably. Our main line of work is to determine just exactly how the farmer can apply this pasture rotation system to operations on his own place for the eradication of the ticks and for the control of them. In many cases these creatures become so common that profitable stock raising is entirely out of the question. This last spring, in some of the southern counties of Texas, one of our agents, Mr. Mitchell, reports that at least 1,000 head of cattle died from a gross infestation of the ticks. The winter was mild, the eggs of the ticks continued to hatch through all of the winter months, and the cattle became so grossly infested—and that on top of poor pasturage—that at least a thousand of them died.

In order to formulate a system of rotation that can be put into operation at different times of the year, it is necessary for us to ascertain exactly how long it takes the eggs to develop at different times of the year, exactly how long the resulting seed tick may persist in the absence of a host, and how long it takes them to develop after they get on a host. Those are all points that vary in different seasons and in different parts of the same season, and in different parts of the country. What we are trying to do is to amass exhaustive information that will result in the formulation of rules that may be applied by every farmer. We expect to evolve a system which will be as definite as to say that, in the latitude of Dallas, for instance, cattle may be put in tick-free inclosures on a certain date, and must be removed by a certain other date, be removed to another pasture on another date. Or, in the case of a large ranch, as definite a rule as to say that cattle removed from a pasture in May may be returned to that pasture on the 15th of October, because by that time all of the seed ticks that may have been in the field when the cattle were removed have died.

Mr. HAWLEY. I would like to know if there is a parasite that kills the tick?

Mr. HUNTER. Yes, sir; we discovered a parasite of a tick related to the cattle tick. It is considered by Doctor Howard quite a discovery, since there are no parasites of that class of animal had been known. It is a new species and a new genus described recently by him.

Mr. HAWLEY. Is it possible to propagate them in sufficient numbers to make them effective?

Mr. HUNTER. I do not know very much about it, because there have been few specimens found. In fact, since the first were found, we have not been able to find any to experiment on the cattle tick.

The CHAIRMAN. Doctor Howard, have you anything further to present to the committee?

Mr. HOWARD. Doctor Hopkins, in charge of our work with forest insects, is here with a lot of specimens. If you have time he will be glad to tell you about them.

The CHAIRMAN. We would like very much to hear from Doctor Hopkins, but the time for adjournment has arrived, and I am very afraid we will have to postpone that pleasure. We have a hearing to-morrow on the Appalachian Park question, and unless the matter that Doctor Hopkins has in hand is something that you regard as of rather vital importance, we would hardly feel like giving any more time.

Mr. HOWARD. Doctor Hopkins's work shows for itself in his publication. Its value is well displayed in my annual report, which I have passed around, and I think that we will be very well satisfied if you do not take up the time.

Mr. A. D. HOPKINS. I could make remarks in about five minutes that would cover all the points I want to speak on.

Mr. POLLARD. I want to ask Doctor Howard just one question. I want to inquire, Doctor, whether you have discovered, or been able to introduce, a parasite for the codling moth?

Mr. HOWARD. We are attempting that now. We have at present in the Bureau in cold storage some hundreds of European cocoons of the codling moths, several of which will have parasites. I have looked into the question of the California importations, but under the old horticultural administration they refused to give out any parasites to other States, but under the present administration I think they will be sent out. In the meantime, however, we are getting cocoons from Europe, and I think we will be able to introduce a number of species on American soil.

Mr. POLLARD. Have you introduced them in any apple-growing sections?

Mr. HOWARD. Not yet; my first lot was received in the autumn, and we are hibernating them in Washington. When we see what we have, we will liberate them.

STATEMENT OF MR. A. D. HOPKINS, OF THE BUREAU OF ENTOMOLOGY, DEPARTMENT OF AGRICULTURE.

Mr. HOPKINS. I want to explain briefly some of the most important features in regard to the work on forest insects which is being done by the Bureau of Entomology under the general appropriation. I want to say that this is a new line of work taken up in 1902 by the Bureau of Entomology. Comparatively nothing was known of the

forest insects or the relation of insects to the destruction of forests previous to that time. Our first work has been to make a general survey of the country to determine the character and extent of the damage caused by forest insects, which we have accomplished. We have had four assistants spending the whole season in different sections of the country, including every State and through the principal forest regions, and in this manner have determined the character and extent of the principal depredations.

The next object was to determine what caused them. We have also partially determined this, that is, we have determined the principal enemies, those that are of vital importance in the destruction of the forests. The next object is to determine a method to control. That we have largely determined, and find that in some cases it is very simple, indeed. In fact some of these invasions may be controlled by the simple adjustment of forests and lumbering methods which will make the conditions unfavorable for the insects to breed, and in that way stop the ravages.

Now, as to the extent of the depredations, we have up to this time not attempted to estimate, but we feel that we are justified in making some estimate from our broad knowledge of the subject and the study of the problem in all sections of the country. And we feel that we can make some statement as to the extent of the losses; that it is one of the big problems in the protection of our future forests; that it is equivalent to the fire problem; that as much timber is being destroyed by insects as by fire, that is, as much mature timber; and that they are an important factor in the destruction of the forests and have been in past centuries.

Now, according to the estimates of the Forest Service the standing timber, that is, the stumpage, the merchantable timber, in the United States, is 2,000,000,000,000 feet, board measure. The stumpage value of this at an average of \$1 per thousand feet, amounts to \$2,000,000,000. The actual price ranges from \$1.44 to \$8.09 per thousand for stumpage, so that is a very low estimate. Now, 1 per cent of that amount, which we are absolutely certain is a very low estimate of the loss caused by insects, amounts to \$20,000,000. Ten per cent loss, which we feel is a conservative estimate, amounts to \$200,000,000.

Mr. HAWLEY. Do I understand that you mean that there is a certain amount, we will say 10 per cent, affected timber this year?

Mr. HOPKINS. Yes.

Mr. HAWLEY. And then next year it will be 10 per cent more?

Mr. HOPKINS. This includes damage to the standing living timber as well as timber killed by the insects.

Mr. HAWLEY. But I mean as to the increase of damage; it is 10 per cent this year, how much more would it be than 10 per cent next year? Would it be 20 per cent next year?

Mr. HOPKINS. No, not 20 per cent next year; it would be simply 10 per cent of the whole amount next year.

Mr. HAWLEY. But never more than 10 per cent is affected at any one time?

Mr. HOPKINS. This is what I mean—as an average. It ranges from no noticeable damage in some sections to 90 per cent in others, as I will show you in one example. To come to the other item, that of forest products. The value of forest products last year was

\$1,075,000,000. One per cent of that would be \$10,750,000, so that we have including the 1 per cent annual losses in standing timber an annual loss of at least \$30,000,000. The results of our investigations show that a large per cent of this amount could be saved if the information we have already gathered was practically applied, and that it can be done with very little expense. Much of our work in the future will be along the line of demonstration, and efforts to interest the people in the importance of utilizing information which will enable them to save a very large per cent of this loss.

As an example of insect depredations we have in the Black Hills of South Dakota, as estimated by the Forest Service, 1,000,000,000 feet of timber destroyed by a beetle which, up to 1901, was an unknown species, but we have traced its work back more than fifty years. Between 1898 and 1906 this insect attacked and killed nearly 90 per cent of the timber in the Black Hills National Forest. The timber thus killed would be worth if living more than \$2,000,000. This loss in one national forest that we know of is an average of \$250,000 a year. This serves as an example of what we know has happened in one national forest.

Mr. McLAUGHLIN. Do you mean 90 per cent of the trees standing in that forest are now dead, and only 10 per cent living?

Mr. HOPKINS. That is the estimate of the Forest Service; that is, of the merchantable timber.

Mr. HAWLEY. What forest is that that you refer to?

Mr. HOPKINS. The Black Hills in South Dakota, all the forest they have in the State of South Dakota.

Mr. GILHAMS. What kind of timber is that?

Mr. HOPKINS. It is pine timber. Here we have a specimen of its work [exhibiting piece of bark to the committee]. It enters the trees and works beneath the bark, making these galleries. The remedy is simply to cut the trees down and utilize them between October and the next July following the year the trees were attacked. The utilization of the timber will destroy the beetle and accomplish the desired result; or, in other words, the utilization of 75 per cent of the standing infested trees will so reduce the insect that it will not continue its depredations.

Mr. HAWLEY. Do the needles on the standing tree turn red?

Mr. HOPKINS. They remain green until April or May, and then they turn red, but after they are all red the beetles emerge from it and fly to the living timber.

Mr. HAWLEY. I have seen trees like that in the Oregon forests and I wondered what was the matter with them.

Mr. HOPKINS. There is another beetle that affects the Oregon forests.

Mr. POLLARD. Have you any method of combating the beetle itself aside from cutting the trees down?

Mr. HOPKINS. We can not treat forest insects as we do other insects; that is, it is impossible to apply any treatment as we would to fruit trees or farm and garden crops, but very often it is easy to control a forest insect by the proper adjustment of methods in forest management and lumbering.

Mr. POLLARD. Have you found any parasite, or have you investigated?

Mr. HOPKINS. The destructive beetles have many parasites, but we do not need them. It is such a simple matter to control this insect when it starts to work. When it starts to work you will find isolated trees with these red tops. That is an indication of trouble, and it is just as important to fell and take the bark off of such trees as it is to put out a fire, because when this particular beetle is present and gets started in that way, it is just as dangerous as a forest fire, because we know and have positive proof of its powers of destruction.

This is only one of several beetles of a genus—a group of beetles—which are all destructive in that way. We have them here [indicating case]. They are small, insignificant creatures, but they occur in such vast numbers and attack the vital part of the tree in such a way that the tree dies, and that is favorable for their multiplication and rapid spread to other trees. We have one in the East. Just last fall I found, at Virginia Beach Va., many hundreds of trees which were killed last year within the corporation. In 1891 and 1892 this same beetle destroyed almost 80 per cent of the standing pine timber in West Virginia and Virginia, and it now occurs all through the Southern States.

Mr. HAWLEY. Do they attack very large trees?

Mr. HOPKINS. They attack the largest trees first.

Mr. LAMB. They killed 3 or 4 acres of trees and then the balance was not killed. What stopped them?

Mr. HOPKINS. The insect is present there yet, but not in great numbers. Here is a photograph of the forest.

Mr. HAWLEY. I remember out in Oregon the second growth of what we call the fir that will die in this way, but I do not remember of ever seeing a very large, full-grown fir tree turn red in this manner. I do not remember to have seen one.

Mr. HOPKINS. We have here a specimen of a beetle which kills the largest red fir. It is not so destructive in Oregon and Washington as it is in the Rocky Mountain region, but in some sections it has killed 40 or 50 per cent of the red firs. It is capable of doing it, but that insect prefers to breed in trees that are felled or injured, while these other insects prefer to attack living trees. That gives, Mr. Chairman, the main features of our work.

Mr. COCKS. Have you anything to do with the chestnut beetle of Long Island?

Mr. HOPKINS. That trouble is not caused by a beetle, we are glad to say. It is evidently caused by a disease which is being investigated by the Bureau of Plant Industry. It is very destructive. There are some insects that are capable of killing the tree, but apparently the prevailing trouble affecting the chestnut is primarily due to a blighting disease.

The CHAIRMAN. Doctor Howard, on behalf of the committee I wish to thank you and your associates for the very clear and businesslike presentation you have made of the work of your bureau. I think we have profited a great deal by listening to these remarks.

Mr. HOWARD. It is very kind of you, Mr. Chairman; you have been very courteous to us, indeed.

Thereupon, at 4.20 o'clock p. m., the committee adjourned until to-morrow, January 30, at 10 o'clock a. m.

WASHINGTON, D. C., *February 3, 1908.*

The committee met this day at 10.15 o'clock a. m., Hon. Charles F. Scott (chairman) presiding.

The CHAIRMAN. Gentlemen, Mr. Robinson, of Arkansas, has introduced a bill, H. R. 13455, which is before this committee, to authorize and provide for the investigation and survey of swamp and overflow lands and to devise a system of drainage therefor. Mr. Robinson desired to appear before the committee this morning to speak in the interest of that bill, but on account of sickness he is unable to attend, and he has submitted his remarks in writing and asked that they be incorporated in the record. Without objection, it will be so ordered. I introduce them at this time for the reason that we completed on Friday evening, as you will remember, the consideration of the estimates of the drainage office, and by inserting these remarks at this place they will be associated with the subject to which they refer.

STATEMENT OF HON. JOSEPH T. ROBINSON, A REPRESENTATIVE FROM ARKANSAS.

Mr. ROBINSON. Mr. Chairman and gentlemen of the committee, I am anxious that there be incorporated as one of the provisions in the bill which your committee will report an appropriation sufficient in amount to enable the Department of Agriculture to make complete investigations and surveys, blueprints, and plans of drainage of such swamp, wet, and overflowed lands as may be deemed susceptible of drainage and reclamation, and also estimates of the probable costs of reclaiming these lands.

THE PROPOSITION IS STRONGLY SUPPORTED BY PUBLIC SENTIMENT.

During the last two years there has been much agitation and discussion as to the importance of speedily reclaiming the swamp land. Various organizations have been formed and conventions have been held in different parts of the United States, largely attended, at which representatives of the Department of Agriculture have appeared. One of these associations, the Drainage and Good Roads Association of the Mississippi Valley, at its meeting held in the city of Memphis last April and at another meeting held at the city of Little Rock subsequently, adopted a resolution strongly urging the action which we seek from this committee. These conventions were attended by representative citizens from Arkansas, Louisiana, Mississippi, Tennessee, and Missouri. The Representatives in Congress from the States mentioned were expressly requested to advocate a liberal appropriation for drainage surveys, investigations, plans, and estimates. Those of us who appear here this morning are a subcommittee for the purpose of presenting to this committee these resolutions.

The importance of general survey and plans must be apparent to every one. While during recent years large quantities of swamp lands have been reclaimed under local laws in many States, yet experience has shown the necessity for general and uniform comprehensive and scientific plans. In many localities thousands of dollars have been wasted and endless confusion and litigation has arisen by reason of conflicting plans and ill-devised drainage schemes.

Success in such undertakings requires harmony which can hardly exist under organizations which seek to sometimes promote local improvements in the immediate community effected at great detriment, expense, and inconvenience to adjoining localities. This work, if undertaken under Federal auspices, will form a basis upon which local improvement districts may organize and reclaim their lands and it will inspire confidence, prevent litigation, and stimulate activity in the reclamation of these lands. If it should be finally determined by Congress that a national drainage fund shall be created to be used in the reclamation of swamp lands, assessed in proportion to the benefits against the lands improved and repaid into the fund to be used in other enterprises, the work which we here seek to have done would be an absolutely necessary preliminary. So, I repeat, it is equally important that this appropriation be made and that this work be done whatever action may hereafter be undertaken by Congress in regard to drainage.

LOCATION OF SWAMP LANDS SUSCEPTIBLE OF DRAINAGE.

The principal areas of wet lands that may be reclaimed are located within the valley of the Mississippi River, the valley of the Missouri River, the swamps of Florida and the Atlantic coast, and those of the Sacramento Valley in California. The total area of swamp land in the United States is more than 60,000,000 acres. I need not elaborate the possibilities of material benefits to be derived from their reclamation. If we assume that two-thirds of this area is susceptible of being reclaimed, we would increase land values in the United States by more than \$3,000,000,000 and the annual crop values by at least \$1,000,000,000. Homes would be furnished for many millions, trade would be increased, and the volume of our agricultural products would be swelled enormously.

There have been brought into cultivation by irrigation something more than 8,000,000 acres. It is estimated by Mr. Wilson of the United States Geological Survey, by the Reclamation Service, that probably 12,000,000 acres more may be placed in cultivation within the next quarter of a century through irrigation. The most conservative figures for reclamation by drainage within the next quarter of a century would far exceed that amount. There can be no good reason why, if the Federal Government should aid in irrigating arid lands, it should not also assist in reclaiming wet lands. The principle is the same. Moreover, it is contended by many who have given extended study to the subject that the possibility of reclamation by drainage far exceeds in probable benefits the benefits to be derived by processes of irrigation. I am not seeking a controversy with gentlemen who promote irrigation. Whether my statement that more good can be accomplished by drainage than by irrigation is correct or erroneous, it is certainly true that the time has arrived when those extensive areas of fertile lands which have so long yielded no tribute to the hand of toil or the genius of enterprise should be made available for practical use. By making this appropriation we may hope to come into possession of sufficient information to solve the engineering problems which lie in the way of the reclamation of these lands. These surveys and investigations must be made. The work

can not go successfully forward without them. The probable cost is but trivial when compared with the benefits to be obtained.

I do not exaggerate when I assert that the practical importance of this subject is prominent in the minds of the people in the entire country. They expect some substantial action by Congress at this session. There is a great movement in many parts of the United States, which seems to be gathering force, looking to the establishment of a general system of drainage modeled after our system for the reclamation of arid land. It is not my purpose to speak of this now. The work which we seek to inaugurate here is necessary and will prove equally fruitful of benefits whether the work of drainage be finally done by local organizations created under State law or by a national system of reclamation under Federal laws.

Much of the surface of the United States has already been mapped in detail. These maps indicate the location of swamps, their location with reference to natural drainage channels, and their altitude compared with neighboring hills and channels. These maps furnish important information, but they do not furnish sufficient engineering information to locate artificial drainage systems nor estimates of the cost of construction. This definite data is sought to be acquired through the appropriation which we ask from this committee.

I congratulate this committee and the Department of Agriculture on their splendid achievements for husbandry during recent years. I can recall the time when this committee and its work were deemed insignificant. But so well has it discharged its functions in the immediate past that it has become one of the foremost committees of Congress. We are confident in a hope that the opportunity now presented to demonstrate the progressive spirit which dominates this committee will not be wasted.

The CHAIRMAN. We have met this morning, gentlemen, to resume consideration of the appropriation bill, and will give our attention to the estimates of the Bureau of Biological Survey. The Chief of that Bureau, Doctor Merriam, is here, and we will ask him to present such facts in connection with his work as he desires to bring to the attention of the committee.

Doctor, perhaps the best way would be to take up the estimates before us and discuss first the increases which you are asking to have made. I notice in the first place that you ask for an increase of one clerk of class 1 and an increase of one clerk at a salary of \$1,000.

STATEMENT OF MR. C. HART MERRIAM, CHIEF OF BUREAU OF BIOLOGICAL SURVEY.

The CHAIRMAN. In your lump sum you submit an increase of \$15,750. I assume that the increase of the clerical force is estimated for with the understanding or expectation that the increase of the lump sum will be granted, and that if there were no increase of the lump sum there would be no occasion for the increase in the clerical force. Is that your understanding?

Mr. MERRIAM. No. There is very great need of the increase of the clerical force on the present basis, particularly for an editor. The present arrangement is very uneconomical, as our chief assistant, Mr. H. W. Henshaw (who is acting chief in my absence), and myself

have to spend at least half of our time in editing manuscripts and bulletins in the office, and I have to spend a large part of my time when in the field in the same way. We need a competent editor more than any other one person in the office. We have never had an editor, and it takes the best men of the office to do the editorial work, which could be done fairly well by a person employed at a very much lower salary for that purpose. This would give the head men more time for the work we ought to be doing.

The CHAIRMAN. About how many bulletins do you publish in a year?

Mr. MERRIAM. I do not know how many in a year, but we always have stacks of manuscript or proofs on our desks—of papers awaiting publication or passing through the press. I think we have six or eight at the present time, and we publish on an average more than one each month. Up to date we have issued in the neighborhood of 160 bulletins and other publications.

The CHAIRMAN. Altogether?

Mr. MERRIAM. Yes.

The CHAIRMAN. Those manuscripts are prepared entirely by the scientists on your force? There are no manuscripts received from outside persons and published by your bureau?

Mr. MERRIAM. None at all.

The CHAIRMAN. So that you would want the additional clerical force, whether there is any increase in the lump sum appropriation or not?

Mr. MERRIAM. Yes. We need an editor very badly, and we need a typewriter-stenographer very badly, as we are shorthanded on that kind of work all along the line.

The CHAIRMAN. Yes. Touching the proposed increase in your lump sum, perhaps the best way would be for you to give the committee a general survey of your work, which would indicate the reasons for this increase.

Mr. MERRIAM. We are carrying on in the Biological Survey three independent lines of work: First, the work on the economic relations of birds and mammals with respect to agriculture, horticulture, and forestry; second, the work on game protection and introduction, including the administration of the Lacey Act relating to interstate commerce in game; and third, the work on geographic distribution of animals and plants, including the preparation of maps of the life and crop zones. The game-protection service has jurisdiction over the introduction of foreign birds and mammals into this country, including the inspection of shipments received at the principal ports of entry. Some 400,000 birds and mammals were introduced last year, mainly at New York, Philadelphia, Boston, Baltimore, and San Francisco. These shipments have to be inspected in order to keep out undesirable birds and mammals, such as the English sparrow, the Madagascar weaver bird, the Java sparrow, and the mongoose, species which if introduced into this country would cause losses of hundreds of thousands of dollars to our agricultural interests every year.

The CHAIRMAN. Can you give us about the sum that you allotted each year to enforce the Lacey Act?

Mr. MERRIAM. We do not allot any definite sum for any of these special purposes, because with our limited force we attend only to

the most urgently needed work, and transfer men back and forth to different pieces of work as occasion arises. Up to two or three years ago the cost of inspection of importations was borne by the importers, but the importers made a protest and the Treasury Department ruled that we had no right to compel them to pay for the inspection; that we must do it ourselves. We have never had any money for that purpose, but had to take it out of our regular appropriation and pay the inspectors ourselves. We have been doing that for the last two years without any appropriation to cover it.

The CHAIRMAN. Do you know how much it takes each year?

Mr. MERRIAM. About \$1,000, I think. The amount is not a fixed sum, because we pay \$5 per inspection. I think there were about 100 inspections last year, but I am not sure of the number. About 500 permits were issued for the importations. We do not pay salaries, but pay by the inspection. The inspectors in each city have to be within telephone call, so that when a ship arrives they can go on board immediately. Many of the shipments contain thousands of birds which are natives of warm countries and would perish if exposed on the decks of a vessel in cold weather, so the inspectors have to go at once when notified.

The CHAIRMAN. Those inspectors are not regular employees of your Bureau?

Mr. MERRIAM. Not at all; they are naturalists, usually ornithologists, who live in the principal ports of entry. We pick out the best men, and they do the work as a favor to us, and also on account of the importance of the service. There are not many men who are competent for this work—men who know the different species when they see them, so we have had considerable difficulty in securing men to make the necessary inspections.

Under the first head, that of the economic relations of birds and mammals, we have two sections—the economic study of birds, and the economic study of mammals—which are united in their administration for economy's sake. In the boll-weevil district in Texas we have found 53 or 54 species of birds eating the boll weevil. Some of these are very important. The oriole, the night hawk, the swallow, and the titlark feed on the weevils extensively. The titlark is a northern bird which breeds up in the Arctic, and is not a citizen of the United States, but passes through our country in the late fall and winters in the Southern States. In the cotton belt it finds the hibernating boll weevils and feeds on them at a time when other birds do not find them, when it is hardest to destroy them, and when their destruction means most to the cotton planter. We find that swallows are immensely valuable in the destruction of the boll weevil.

We have published three bulletins on the bird enemies of the boll weevil and two special circulars calling the attention of the people of Texas and the people of the North to the importance of increasing the numbers of swallows and martins by increasing the available nesting sites, so as to help the cotton planters of Texas in their fight against this insect. You know the boll weevil has crossed the Mississippi River and is now in Louisiana and Mississippi, so that it is very important to secure protection for all birds that feed on it in the Southern States.

The CHAIRMAN. In view of the enormous numbers and rapidity of propagation of the boll weevil, is it your opinion that the birds can make any appreciable inroads upon them?

Mr. MERRIAM. Yes. They can not exterminate the boll weevil by any means, but they are one of the most valuable means of holding it in check. When the boll weevil was introduced a few years ago our birds did not know it; it was a new insect. Now they are learning more and more about it each year, and at least 44 species have learned to feed on it and thus have become allies of the cotton planter in fighting the pest.

The CHAIRMAN. To what extent are the birds that feed on the boll weevil protected by the laws of the States where the boll weevil exists?

Mr. MERRIAM. They are being more and more protected every year, owing to the fact that we have explained to the legislatures of the States interested the importance of preserving these birds. That kind of thing is one of the general results of our economic work all along the line—of our studies of the food habits of cuckoos, and orioles, and grosbeaks, and chickadees, and titmice, and other birds. Whenever we find a bird particularly important in the destruction of insects like the boll weevil and scale insects we make a point of presenting the facts to the State legislatures.

The CHAIRMAN. In what way do you do it? Do you present them to the legislatures in person, or by writing to the governors?

Mr. MERRIAM. As a rule the chairman of the committee on game protection in each legislature writes to us each year, or in the case of biennial sessions every other year, for suggestions as to amendments in the law for the protection of birds and mammals, often requesting us to send a man there to address the committee on the subject. Doctor Palmer, our assistant in charge of the game preservation work, has addressed legislatures all over the country at their request, and in many cases joint meetings of both houses have been held to hear him; so we are largely responsible for the improvements that have been made in the game laws of the several States during the last ten years. As a rule the changes from year to year give better protection to birds useful to agriculture.

Mr. LEVER. Do you work in cooperation with the Audubon societies throughout the country?

Mr. MERRIAM. Yes. You know that during the past four years the President has set aside 14 bird reservation islands along the coast. We have no funds for employing wardens to protect these reservations, but we appoint wardens and pay them \$1 a month, so as to make them public officers, and the Audubon Society pays their salaries. That help is very essential, in view of our small appropriation, for otherwise we could not protect the birds at all, and the creation of the reservations would have no effect.

Mr. LEVER. Do you send out the Audubon Society literature under your frank?

Mr. MERRIAM. No. It is sent out from the Audubon Society in New York. We have nothing to do with that.

We have found that the cuckoos and orioles are enormously valuable in destroying the hairy caterpillars which defoliate our shade trees. In New England and the Eastern States generally there would be probably few, if any, shade trees left in the towns and cities if it were not for the orioles and cuckoos, which eat the hairy caterpillars. We have found that the scale insects, such as the San José scale and others so destructive to fruit and which until recently were supposed not to be eaten by any birds, are eaten by at least 57

different species of birds, and that the grosbeaks and titmice eat very large quantities of them.

Mr. RUCKER. How do you determine what particular species of birds will eat a given insect?

Mr. MERRIAM. We watch them in the fields, and we examine their stomachs to see what they have eaten.

Mr. RUCKER. But then you have to kill the birds in order to find out?

Mr. MERRIAM. Yes; but we kill very few of them. We have an arrangement with bird collectors all over the country by which they send us the stomachs of birds killed for specimens. We have examined 40,000 stomachs in order to find what the birds eat in each part of the country and at each season of the year.

Mr. RUCKER. They send you simply the stomachs of the birds?

Mr. MERRIAM. Yes. We furnish them with tags and jars of alcohol and blank schedules for the data we want, and we pay the express charges. It is seldom that we have to kill a bird in order to find out what it has been eating.

Mr. LEVER. I understood you to say that the President had set aside a number of bird preserves in the coast States?

Mr. MERRIAM. Yes; a number of islands. I have a list of those islands right here.

Bird reservations.

Florida:

Indian Key Reservation.
Passage Key Reservation.
Pelican Island Reservation.

Louisiana:

Breton Island Reservation.
East Timbalier Island Reservation.
Shell Keys Reservation.
Tern Islands Reservation.

Michigan:

Huron Islands Reservation.
Siakiwit Islands Reservation.

North Dakota:

Stump Lake Reservation.

Oregon:

Three Arch Rocks Reservation.

Washington:

Copalis Rock Reservation.
Flattery Rocks Reservation.
Quillayute Needles Reservation.

Wardens.

5 wardens of bird reservations:

| | |
|-----------------------------------|---|
| Breton Island Reservation..... | 1 |
| Passage Key Reservation..... | 1 |
| Pelican Island Reservation..... | 1 |
| Stump Lake Reservation..... | 1 |
| Three Arch Rocks Reservation..... | 1 |

5

There are 14 in all.

Mr. LEVER. Are these islands the property of the United States?

Mr. MERRIAM. Yes. They have been set aside as bird reservations. They are valueless for agriculture, but may be used by the Department of Agriculture for experimental purposes.

Mr. WEEKS. Is there any law for setting aside game preserves?

Mr. MERRIAM. Yes; it is done under a law which is quoted in each case when the island is set aside. I am not personally familiar with the law.

The CHAIRMAN. How has the expense involved in the establishment of game preserves on these islands been borne?

Mr. MERRIAM. There is no expense except for the wardens. The Secretary of Agriculture appoints a warden and pays him a dollar a month, so as to make him an officer of the Government, and the Audubon Society pays his salary. In that way we have been able to protect the islands. We have saved the breeding colony of pelicans on Pelican Island, Florida, in the last few years.

Mr. RUCKER. After you have raised that crop on that colony, what are you going to do with that?

Mr. MERRIAM. Let them alone. The pelicans are one of the most attractive objects of interest to visitors in the winter. They are of no economic value.

Mr. RUCKER. But their only value, then, is to offer an additional inducement to citizens of other States to go to Florida and look at the pelicans?

Mr. MERRIAM. And preserve the birds from extinction.

The CHAIRMAN. These islands are entirely uninhabited?

Mr. MERRIAM. Yes.

We have found that our native sparrows are of great service to agriculture. In the winter and late fall and early spring they feed almost exclusively on weed seed. One little sparrow, which does not breed in the United States at all, consumes annually in the State of Iowa about 875 tons of weed seeds. It has been computed that our native sparrows save the farmer 1 per cent of the value of the crops—a saving last year of about \$35,000,000.

Mr. STANLEY. Right there, Doctor, do they by eating these seeds prevent the spread of the weeds, or do they scatter them? I was under the impression that the birds eating the hard seeds of a great many weeds would tend to scatter them.

Mr. MERRIAM. That is true in the case of some birds and a few plants; for example, the seed of the poison ivy or poison oak is not digested in the stomachs of most birds, and wherever planted it takes root. But that is an exception, and not the rule.

Mr. STANLEY. I have noticed little elm trees and other trees and shrubs growing along the fence rows, and I am told that they are planted by the birds.

Mr. MERRIAM. Choke cherries are planted in that way also. It is a good thing. Choke cherries attract the birds from more valuable fruit.

The bob-white or eastern quail feeds so largely upon seeds that, out of many hundred crops and stomachs that we have examined weed seeds form 50 per cent of the entire food of the year and insects 15 per cent. Now, the quantity of food eaten by a quail is about an ounce a day, or about 12 pounds of weed seeds and 3 pounds of bugs for each quail per annum. The quail of Virginia have been estimated to eat 968 tons of weed seeds and 171 tons of insects each year.

Mr. STANLEY. Quails in our country are not particular about weed seeds. They will eat corn and wheat.

Mr. MERRIAM. They eat a small amount of corn, but not much wheat.

The hawks and owls are among the most beneficial of birds to agriculture in general. A few years ago a majority of the States,

and many counties in States in which county bounties were paid, paid bounties on hawks and owls.

Mr. STANLEY. What breed of hawks—the sparrow hawks or the chicken hawks?

Mr. MERRIAM. They paid bounties on every hawk.

Mr. STANLEY. I have been trying to get the Kentucky legislature to pass an act to give a bounty for every hawk scalped.

Mr. MERRIAM. That would be a very pernicious act. [Laughter.] We have examined the stomachs of about 5,000 hawks and owls and find that of the 68 or 70 kinds of these birds in the United States only three habitually prey upon poultry. These three are the goshawk, the cooper hawk, and the sharp-shinned hawk. As to other kinds of hawks, poultry forms only about 1 per cent of their food.

Mr. STANLEY. There is a gray hawk that stays right straight with the flock wherever it goes.

Mr. MERRIAM. That is the cooper hawk, which should be killed wherever found.

Mr. McLAUGHLIN. What is the first named?

Mr. MERRIAM. The goshawk, a large bluish-gray hawk, that does not breed here. The cooper and sharp-shinned breed here and are with us all the year round.

Mr. HEFLIN. What do they feed on?

Mr. MERRIAM. Hawks and owls feed mainly on grasshoppers and crickets in preference to other food during the summer and fall, and the rest of the year feed mainly on meadow mice. Each hawk destroys in a year about a thousand field mice or its equivalent (in bulk or weight) in insects, mainly grasshoppers. Now, if you put the value of the crops destroyed by each field mouse or its equivalent in insects at only 1 cent a year, which is certainly very much too low, you reach the conclusion that each hawk is worth \$10 a year; if you put it at 2 cents, which is still an underestimate, you get \$20 a year as the value to the farmer of each hawk in the country.

This value mounts up rapidly in districts where the meadow mice are particularly numerous and destructive, as they are just now in parts of the West, where they have ruined the alfalfa crop to such an extent that there will be no alfalfa again until there is a new seeding. Every few years we have somewhere an epidemic of field mice. This is due partly to an increase in the food supply and partly to the destruction of their natural enemies, the hawks and owls and weasels and skunks and badgers, which prey upon them, and which the ranchmen kill until they learn better. After one of these epidemics it is as much as a man's life is worth out there to kill one of the enemies of the field mice.

A plague of field mice swept over the Humboldt Valley in Nevada last fall. I was notified of it in November. I was in California at the time, and sent a competent assistant to investigate it at once. He found that at Lovelocks, Nev., there were 160 burrows of field mice to the square rod, making 25,600 to the acre. Allowing half of these to be inhabited by one mouse each, there were over 12,000 mice per acre. One ranchman reported in October that he had lost \$50,000 worth of alfalfa. Our man found that in November over \$100,000 worth of alfalfa had been destroyed at Lovelocks, and the fields were so nearly ruined that they were being plowed up. The whole crop

was ruined. I have photographs here [submitting same] showing the way the alfalfa looks and the holes of the meadow mice.

This one [indicating] shows how the roots are eaten off, about 6 inches down. There were then about 12,000 meadow mice to the acre, and they were finishing up the alfalfa fields and ruining them. Our man who is there at work to-day, poisoning the mice, finds that they have completed the destruction of the alfalfa fields, and are now eating horse manure and cow manure and spreading out over the desert on both sides of Humboldt Valley, eating greasewood bushes; and that the mice are now starving. He says there are now only about 1,500 to the acre, instead of 12,000, as in November. When the migrating hawks struck Humboldt Valley, they camped right there, and when they ascertained after a few days that they were not shot at, they became tame and would sit on the barnyard fences and along the roadsides and would eat all they could of the meadow mice. A flock of about 200 gulls came there and began feeding on the mice, and they have been feeding on them ever since; and crows and ravens came by and stopped, and they also are feeding on them. All those birds are protected by the ranchmen now, but it is too late. In the case of these great epidemics the natural enemies that kill off the mice that cause the plague come in and multiply too late—after the damage is done. The area about Lovelocks, in Humboldt Valley, is completely destroyed, so far as the alfalfa crop goes.

Other crops, as potatoes and fruits, are ruined also. In this particular case the matter is even more serious than usual. For the Government has spent some \$4,000,000, and is contemplating the expenditure of \$9,000,000 in all, in irrigating this part of Nevada, the Carson Sink country. The Truckee-Carson project calls for the irrigation of 400,000 acres of very fertile land. This land will be absolutely worthless to agriculture unless we can practically exterminate the mice upon it, because as fast as any green thing shows itself above the ground the mice will eat it off.

Mr. STANLEY. How do you account for the appearance of these mice before the land was irrigated? It was a desert, was it not?

Mr. MERRIAM. Yes, originally; but the mice did not multiply until after the Lovelocks area was irrigated and under alfalfa. What occurred here is the natural result of irrigation and the growth of crops in an area where the natural enemies of gophers and mice are killed off. In this case the destruction is all done by mice. In other cases the damage is done by ground squirrels, gophers, rabbits, or other pests.

The CHAIRMAN. What do you find to be the best method of destroying these mice?

Mr. MERRIAM. We find strychnine on wheat and chopped alfalfa to be wonderfully successful. We have tried a great many experiments lately. We had a double duty to perform there. We had to kill off the mice and at the same time save the stock and birds. We found the farmers using a phosphorous preparation which killed so many birds that in one place on 4 acres we found 67 dead larks. We found one kind of hawk that was not killed by eating the poisoned mice. It had a peculiar way of eating mice. It would put its claw on the mouse and with his beak pull out the intestines and leave them, and so did not get enough phosphorus to be killed.

In the strychnine experiments we tried to dilute the strychnine so that it would not kill the birds. It was found that by using an ounce of strychnine to 100 pounds of grain it did not kill the birds. We tried putting the grain in the mouths of the burrows, but that proved very costly and tedious. A man could treat in that way only about 2 acres a day, but it cost less for the grain. By broadcast sowing a man could treat 15 acres in a day, and by machine sowing 70 acres in a day. It was found that by sowing chopped alfalfa soaked in strychnine—a very clever thought on the part of the man who was doing the work—more mice were killed than by any other method, and the birds were not harmed. Chopped alfalfa soaked in strychnine solution proved to be as efficient as wheat and had the great advantage that no bird would eat it.

This is an exceedingly important matter just now, because the field-mouse plague is extending over other regions. In the neighborhood of Provo, Utah, around Utah Lake, it exists to-day, and we are having very serious complaints as to the destruction of alfalfa there. In the Klamath Lake region in southwestern Oregon, where the Government is building extensive irrigation and drainage works, and where an immense area will soon be under alfalfa, this pest is increasing also, and is likely to prove a serious menace to the development of that region. To devise means of destroying these mice, therefore, seemed of more importance to us than any other work we were doing, and although we are so extremely short of funds that we have not enough to get through the year with our regular work, yet we have sent our best men there and are using every means in our power to destroy the mice. If we had the means we would also tackle the same problem in the Klamath and Provo regions before it is too late. After the damage has been done it takes several years to get the ground into bearing again.

The CHAIRMAN. How big an area is infested in Humboldt Valley?

Mr. MERRIAM. An area a mile or two in width and 15 miles in length. But the area that will be affected will be the whole of the Truckee-Carson irrigation project.

We are also experimenting, and have been for the last two years, with bacterial inoculations of disease germs to destroy mice and gophers, and particularly ground squirrels. We have done most of the work on ground squirrels, chiefly the ground squirrels of Washington and Oregon. Many diseases that will not kill the hardy ground squirrels will kill the mice.

The CHAIRMAN. Have you been successful in introducing those diseases?

Mr. MERRIAM. No, we have not. There is something very peculiar about that. Sometimes they work better than at other times. Some cultures will kill all the animals inoculated with them and others will not. Feeble cultures may sometimes be strengthened by passing through two or three animals, and so made virulent again. It is a branch of experimental work that is yet in its infancy; we do not know much about it. We have tried imported cultures of various kinds that have been recommended abroad, but we have not had much success with them.

The CHAIRMAN. That is another illustration of the perversity of nature, that diseases that communicate themselves with fatal rapid-

ity to many valuable animals can not be propagated at all among harmful animals.

Mr. MERRIAM. That is sometimes the case; but we have been afraid to experiment with diseases that are injurious to domesticated animals; we will not introduce these anywhere. We test cultures first, in order to find out whether there is danger to domesticated animals before they are used on squirrels or mice or rabbits.

In California the rats have introduced the bubonic plague into San Francisco. The officers who have had that matter in charge report the killing of 130,000 rats in San Francisco in four months. Of that number, 11,000 were examined for bubonic plague, and 106 were found to have the disease. But rats are not the only animals that carry the bubonic plague. One of the large gray ground squirrels, which has an extensive distribution in California, also carries it. Three men who killed ground squirrels last fall in the neighborhood of San Francisco Bay developed the plague, and two of them died of it.

Mr. McLAUGHLIN. How is it communicated to human beings?

Mr. MERRIAM. By flea-bites. The fleas carried by the rats and squirrels bite the subject and inoculate him with the disease.

The area inhabited by the meadow mice which are doing the damage mentioned in Nevada and Utah we mapped some years ago, so that when we learned of the outbreak we knew at once what the species was and where it lives. Here [submitting same] is a map showing its distribution in Nevada, and here [submitting map] is a map of California showing the distribution of the several species of meadow mice in that State.

Gophers are among the more serious enemies of agriculture in the West. We have been experimenting for many years in destroying gophers by means of poisons and traps. During the last few years several traps have been perfected, which are very simple and catch the gophers in large numbers, and there are certain poisons which can be used with success if introduced into the main subterranean tunnels of the gophers; but we find a great deal of difficulty in teaching the farmers and irrigation experts how to use the traps and poisons. The gophers have many lateral burrows which come up from the main underground tunnels to the surface, through which they throw out the earth that make the gopher hills. If poisoned bait is put into the laterals the gopher will usually throw it out without finding it because he comes to it with a plug of earth he is pushing ahead of him. Hence poison for gophers must be placed well back in the main tunnels. Gophers do great damage to the irrigation canals and levees in the West. A few days ago, while operating on the main levee at Fallon, Nev., on the Truckee-Carson canal, one of our men caught 15 gophers in about three hours in the daytime and 8 at night in a very simple trap. The irrigation engineers are much disturbed by the damage done by the gophers, and well they may be, for the gophers are continually throwing earth into the ditches and boring holes in the banks, causing washouts and breaks in the levees and entailing a heavy expense for repairs.

Mr. STANLEY. Is that gopher something like the beaver in our country, or is it like the muskrat?

Mr. RUCKER. It is something like the muskrat, but not so large.

Mr. MERRIAM. Here are three photographs [submitting same] taken at Fallon, Nev., showing the damage resulting from the tunneling

of levees by gophers. The repairs of the breaks here shown cost from \$200 to \$500 each. This one [indicating], where the washout carried away the road as well as the levee, cost \$500 to repair. The engineers find this a very serious matter, and have asked the Biological Survey to prepare a special circular for them, containing practical directions for the destruction of gophers in the canal and ditch banks. They have also asked us to send an expert to their meeting at Yuma, which is in session to-day. But unfortunately we have not enough money to enable us to do this. We have furnished them with traps and directions, but could not send anyone to make an actual demonstration of our methods.

Mr. RUCKER. Have you a picture of the gopher there?

Mr. MERRIAM. Here is the gopher himself [submitting specimen.] And here is the particular mouse [submitting specimen] that has ruined the alfalfa in Humboldt Valley, Nevada. The same species is now destroying alfalfa fields in the Provo country in Utah.

Mr. WEEKS. Doctor, can they keep any women in the Humboldt Valley? [Laughter.]

Mr. MERRIAM. Certainly.

A little while ago I called your attention to the fact that hawks and owls eat great quantities of mice. You know that hawks and owls, when they eat gophers and mice and game of that sort, swallow them in big chunks, bones and all. Then they sit still for awhile and digest the soft parts; and after a while the hair and whatever bones remain are ejected in the form of furry pellets. Here are thousands of skulls of mice [submitting photograph] taken from pellets found in a tower of the Smithsonian Institution building, ejected by a family of barn owls which make their homes there in the top of the Smithsonian.

The CHAIRMAN. These pellets are taken from their roosting places?

Mr. MERRIAM. Yes. The bulk of their food consists of small animals of this kind.

Gophers not only burrow in the banks of canals, they also live in cultivated fields where they eat alfalfa and tuberous crops and roots of all sorts, including those of fruit trees. In western orchards you may see fruit trees with the leaves suddenly turned brown, and if you investigate, you will be surprised to find that you can tip such trees over with one hand, because the roots are eaten off by the gophers. Besides the damage done in these ways, gophers throw out enormous quantities of earth, which in a gopher country covers on the average about one-tenth of the land. You have probably noticed that, Mr. Chairman, in Kansas.

The CHAIRMAN. Yes. Roughly, what is the range of this gopher?

Mr. MERRIAM. The range is shown on this map [submitting same]. The yellow area is inhabited by the plain-toothed gophers; the orange and green areas by the groove-toothed gophers; the total area is about 2,000,000 square miles, or 1,280,000,000 acres.

The CHAIRMAN. I think the worst pest we have in eastern Kansas is the mole.

Mr. RUCKER. How do you catch him, Doctor?

Mr. MERRIAM. We find him a very beneficial animal. May I ask what damage moles do, in your opinion?

Mr. RUCKER. They plow through the yard and through the flower beds and rosebushes, and they will eat corn.

Mr. MERRIAM. They throw up ridges under hedges, and sometimes in strawberry beds and cornfields in search of grubs, but they do not eat corn to my knowledge.

Mr. RUCKER. They will make trails 3 or 4 feet apart and crossways, and in all sorts of shape, and the grass around there all dies, and you can trace them everywhere.

Mr. MERRIAM. They would not do that if the roots and grass were not infested with grubs. It is the same with skunks. If the grass on lawns is dying out, you may notice small holes, and a few days later more holes, and if you go out in the evening you may see skunks digging out the big grubs that are ruining the lawn. Of course the moles do harm mechanically by throwing up ridges of earth, but they are not vegetable feeders; they do not eat roots. Meadow mice often follow the mole's runways and in this way reach the roots which the mole has uncovered in his search for grubs. Where the mole has taken the grub, the mouse follows and eats the root.

Mr. RUCKER. I knew he killed the roses, and I thought he ate the roots.

Mr. STANLEY. They often kill growing corn by ploughing along where the corn has been planted. Of course, as to the general impression that they eat corn, I did not know about that positively.

Mr. MERRIAM. Where the mole goes close enough to the corn he may injure it by exposing the root to the air, but you may depend upon it that he goes there for the grub, and not for the corn.

Mr. RUCKER. Let me ask you this question: What can you do to get rid of those grubs; or, if you are going to have the grubs, how are you going to get rid of the moles? I would rather have one than both.

Mr. MERRIAM. I can not tell you how to get rid of the grubs. That is a question for the entomologist. But there are several good mole traps by which the mole can be caught, and there are also gopher traps which may be used for moles. But the mole is not so easy to catch as the gopher.

Mr. RUCKER. He is hard to catch. He has ruined my yard nearly every other year for ten years.

Mr. MERRIAM. The destruction wrought by gophers we estimate at \$12,000,000 a year; the damage done by ground squirrels at \$10,000,000 a year. These are not overestimates. There are very many species of ground squirrels in the West, but none in the East—at least not farther east than Michigan.

Mr. STANLEY. How much damage did you say the ground squirrels do?

Mr. MERRIAM. About \$10,000,000 a year, from the Mississippi Valley westward.

Mr. STANLEY. How about field mice?

Mr. MERRIAM. They are extremely destructive. The damage they do is estimated at something over three millions a year. They are the animals I have already mentioned as destroying the alfalfa crop in several parts of the West.

The damage done by rabbits also is very great, and it is a little harder to meet. It amounts to about \$600,000 a year, I think, on the average. The injury is done to fruit trees and nurseries and various crops. Rabbits are very hard on nurseries.

Mr. STANLEY. A great many rabbits are eaten in this country, are they not?

Mr. MERRIAM. Yes. They are valuable for food, and their food value is likely to increase.

The wolf problem is one that has taken a great deal of our attention in the past few years. The wolves and coyotes together destroy stock—cattle, sheep, hogs, and colts—amounting to about \$13,000,000 a year, so the stockmen claim in the different parts of the West. Up to two years ago the efforts to keep down the number of wolves and coyotes were very unsuccessful. Many of the States paid bounties, and still pay them on wolves and coyotes. Wherever bounties are paid they result in the manufacture of scalps—or in other fraudulent practices—which deplete the State treasuries. A year ago last spring, in February or March, at the request of the Forest Service—at the request of Mr. Pinchot—we sent out our best man in this line of work to see if he could devise any practicable means by which the number of wolves on the stock ranges could be decreased. He went first to the Greene River Basin in Wyoming, arriving when the ground was covered with snow and when the thermometer was 20° below zero. He put on his skis and traveled through the country and tried to see if it were possible to locate the wolf dens—something that had never been done before. He found that he could locate every den and destroy the young wolves. He showed the rangers and cowboys how to find the dens and destroy the young, and prepared a bulletin on the subject for the forestry people.

The CHAIRMAN. How did he locate the dens?

Mr. MERRIAM. By finding the tracks and studying the habits of the wolves; finding where the she wolves went, and finding where they sat on certain promontories in the neighborhood of their dens. He found that there was sufficient regularity in their habits so that it was perfectly possible for an active man to find every den in a region and kill off all the pups.

The CHAIRMAN. Was that in the nature of a new discovery? Did your man exercise any greater skill in locating the wolf dens than an ordinary cowboy, who had been in the country all his life?

Mr. MERRIAM. The cowboy had never done it, and no one had done it. It never had occurred to them that this was a method of holding in check the increase of wolves. The breeding time of wolves on the western plains and foothills is in March and April—a time of year when the cowboy is not out much on the range. He is then at headquarters. Following our directions the rangers and stockmen took the matter up and were surprised to find that they also were able to locate the dens and destroy the wolves. In the upper Green River Valley this last spring they killed 47 pup wolves; in the adjoining forest at the east base of the Wind River Mountain they killed 33; in the Highwood Mountains of Montana they killed 16, and in the Gila National Forest in New Mexico, 15. Besides the pups there were killed in the same localities 36 old wolves, making a total of 146 wolves killed last spring in or near four national forests as a direct result of the work of our expert field naturalist in showing them how to do it. He also himself found a den of pups near Marquette, in the dense forest of northern Michigan, where the people knew nothing about the wolf dens, and where the wolves destroy hundreds of deer.

Mr. RUCKER. Can not any man track them to their dens?

Mr. MERRIAM. He can if he knows how and has sufficient energy. He must not follow any track, because it might turn out to be that of

a dog wolf. But there are certain regular routes which the she wolf has, so that a man can learn to detect them.

Mr. STANLEY. Is the number of wolves that has been slain any appreciable per cent of the number of wolves that have inhabited that region?

Mr. MERRIAM. Yes. Nearly every den has been found in the areas in which this work has been done. One hundred and forty-six wolves, young and old, were killed in four localities. This number of wolves, according to the estimates of the cattlemen, would destroy \$146,000 worth of stock every year.

Mr. STANLEY. A wolf destroys a thousand dollars worth every year?

Mr. MERRIAM. Yes; that is their estimate.

Mr. STANLEY. Do they kill sheep like dogs—just suck the blood, and leave them there?

Mr. MERRIAM. They kill for food about every other day, and do not go back to the carcass from time to time until it is consumed, as do some other animals, but make a fresh kill every time. We have just received word from the deputy auditor of Wyoming, Prof. F. J. Niswander, as to the number killed in that State last year compared with those killed in previous years. About 500 more wolves were killed in the State of Wyoming last year than during preceding years. That means a saving of over \$500,000 to the stockmen of Wyoming.

Mr. STANLEY. How much more is that? Do you know how many were killed before?

Mr. MERRIAM. I do not know exactly, but the total number of wolves killed in Wyoming averages about 1,200 or 1,400. They are killed by trapping and poisoning and hunting with gangs of trained wolf dogs. Some of the big ranchers keep gangs of special dogs to hunt wolves all the year around. It is exceedingly expensive to keep the wolves in check, but unless their increase is checked the loss of stock is enormous.

Mr. HAUGEN. Doctor, you told about the gophers doing a great deal of damage. What are you doing to exterminate them and the injurious birds?

Mr. MERRIAM. We have published directions for the destruction of gophers and are still experimenting to find better and cheaper methods. There are very few birds that are injurious throughout the year.

Mr. HAUGEN. Is anything being done to exterminate the injurious birds?

Mr. MERRIAM. No. We have conducted a great many experiments in destroying English sparrows. The English sparrow is probably the most injurious bird we have in the United States. We find that English sparrows can be netted pretty successfully by men skilled in that work. They can be poisoned, but they are a very intelligent bird, and it is hard to poison them more than once in the same locality. The best way to hold them in check is to have in each town or village a man whose business it is to haul down their nests with a long pole with a hook on it; to haul down their nests from buildings and trees. That is the most practicable method, but it almost always runs against a snag. Some tender-hearted person in each town will think it wrong to destroy the nests of sparrows, and that person will make such a hubbub that the work is stopped.

Mr. STANLEY. It would be well to have a fool killer along with the nest destroyer, would it not?

Mr. MERRIAM. Yes.

Mr. LEVER. Who introduced the English sparrow into this country?

Mr. MERRIAM. Col. Nicolas Pike, of Brooklyn, introduced them in 1850, I think, in the neighborhood of Brooklyn.

Mr. LEVER. It was not an introduction of the Department?

Mr. MERRIAM. No. The Department has never done anything of the sort. The Department aims to keep out noxious pests of all kinds. That is one of the difficult features of our work—by inspecting more than 400,000 birds and mammals that come into this country every year—to keep out the noxious kinds.

Mr. RUCKER. There is no remedy for the English sparrow, is there, Doctor, and we will always have him?

Mr. MERRIAM. We shall always have him. I think the English sparrows have reached their maximum abundance in most of the Eastern States, but they are still spreading in the West.

Mr. LEVER. They are destructive to crops?

Mr. MERRIAM. Yes; they are destructive to many crops. In places they invade the wheat fields and do a great deal of damage to the ripening grain.

The common rat does a great deal more damage than one would suppose. Recently, in connection with the work in San Francisco and other places, we made a little investigation of rats here in Washington. A year ago Woodward & Lothrop complained bitterly of losses in their store, saying that the rats damaged about \$50 worth of lace curtains and kid gloves every night in their establishment. They asked us if we could do anything to help them. We sent a man there, who showed them in a few nights how to catch rats. Since then numerous firms in New York have heard about it and have appealed to us for directions.

Mr. LEVER. What did you do?

Mr. MERRIAM. We introduced a simple method of trapping. If poison is used a certain percentage of the rats will die in the building and make such a smell as to render it uninhabitable—so poison is not practicable.

Mr. STANLEY. We are interested in that mouse-trap business.

Mr. MERRIAM. We are up against a peculiar difficulty in the matter of traps; it is a source of great embarrassment to us. A number of ingenious Yankees are always making improvements in traps. Each year we find some trap several times as effective as any in existence before. We are not allowed, however, to put into our publications the name of any particular trap, or to mention the manufacturer, because that would be interpreted as favoritism.

Mr. McLAUGHLIN. Why can you not?

Mr. MERRIAM. It is a rule of the Department.

Mr. HEFLIN. It would give one manufacturer an advantage over another?

Mr. MERRIAM. Yes. We feel that we ought to be able to recommend the best trap, but we can not do that in our publications. We can tell a man orally what trap has proved most successful in our hands, but we can not print the name of the trap in our circulars.

Here in the city of Washington there are about 3,000 dealers who suffer injury from rats—the commission merchants, grocers, stables,

keepers of fruit stalls, and dealers in foodstuffs, in hats and furs, and the proprietors of market stalls. In Center Market the losses foot up to about \$15,000 a year, so far as we have data. The aggregate loss by the markets and hotels and restaurants and provision houses and dealers is about \$300,000 a year, according to their own declarations, and the loss in private families amounts to about \$200,000 a year, making a total loss in Washington of half a million dollars each year from rats.

The CHAIRMAN. Tell the committee what this trap is, or how you use it.

Mr. MERRIAM. I have not the trap with me. Professor Lantz, one of my assistants in the Biological Survey, has charge of the rat work. I shall be very glad to send you up the trap that we find most successful. I have not got it here.

The CHAIRMAN. I wish you would do that. Please describe the trap.

Mr. MERRIAM. I do not think, Mr. Chairman, that I can describe the trap so that it would be worth while. There are two makes of traps which we find particularly successful. They are built on the same principle—an inconspicuous platform with a metal loop or spring which strikes down and kills the animal. The thing does not look like a trap to the animal and therefore does not frighten him. There are several kinds of these, and one kind we find better than the others.

Mr. STANLEY. I suggest, Mr. Chairman, that Doctor Merriam send that gentleman up with his trap.

The CHAIRMAN. All right.

Mr. HEFLIN. Is it like these small traps composed of a flat piece of wood with a spring, costing 5 or 10 cents apiece?

Mr. MERRIAM. Yes.

The CHAIRMAN. You are familiar with the basket trap, a large wire basket with a sliding door?

Mr. MERRIAM. Yes. That is an old-time trap that has come down to us from time immemorial.

The CHAIRMAN. I have had experience with that trap, of getting it practically full of rats one night and not getting a rat in it the next night. Is there any particular reason why that should be so, when the supply of rats is not exhausted?

Mr. MERRIAM. That is one of the commonest experiences in trapping rats. They soon learn to fear a trap, and the majority of those caught are young ones. It seems after a night or two that they learn to fear almost every kind of a trap that can be used to catch them. It is only the simplest style of trap—something which does not look to them like a trap—that may be used with success night after night. Rats and English sparrows are among the most difficult things to trap.

Mr. LEVER. Do you bait these traps?

Mr. MERRIAM. Yes, sometimes. We sometimes use them as a runaway trap, and sometimes employ a bait.

Mr. McLAUGHLIN. The trap you speak of catches only one?

Mr. MERRIAM. Yes. We have others that catch more, but after being used once or twice the rats get shy of them.

Mr. LEVER. The rat is a pretty shrewd animal.

Mr. MERRIAM. He certainly is. There is no question about that.

Mr. HAUGEN. Doctor, is the Department importing birds?

Mr. MERRIAM. No; it is simply inspecting importations.

Mr. HAUGEN. Is it importing birds or animals of any kind?

Mr. MERRIAM. No; not of any kind. It has no money to spend for that purpose. It has never done anything of that kind.

Mr. HAUGEN. Do you deem it advisable?

Mr. MERRIAM. Not as a rule. It is a dangerous experiment to import an exotic species that multiplies rapidly. I will take that back so far as it relates to game. It is perfectly safe to import any bird or animal of large size, because it is so easily shot. If it is a game animal, its shooting is desirable; everyone wants to kill it. There is no danger in importing grouse, pheasants, or capercaillie, and large numbers have been imported.

Mr. HAUGEN. But not by the Department?

Mr. MERRIAM. No. The Department supplies information on the subject, but it does not do any importing.

The ground squirrels do an amount of damage nearly equal to that done by the gophers. They inhabit very large areas in the West—collectively they inhabit about two-thirds of the area of the entire United States. In many States bounties have been paid for the destruction of ground squirrels. In Tulare County, Cal., a few years ago each supervisor was allowed \$500 a year for poison to be distributed in his district, and on a grain ranch of 8,000 acres in San Joaquin Valley \$500 a year was spent in poisoning ground squirrels at a saving of five times the cost. At the present time Oregon spends about \$50,000 a year in fighting ground squirrels; Nevada spends \$50,000 a year; Idaho, \$75,000 a year; California, \$100,000, and Washington \$160,000.

The CHAIRMAN. That is not done by the States?

Mr. MERRIAM. Some of the States supply the poison and distribute it in regular organized ways to the farmers who want to use it. In one county (Whitman County) in the State of Washington, where two species of ground squirrel abound, the loss is claimed to be half a million dollars a year. This is the region in which we have been conducting the inoculating experiments of which I spoke and which I regret to say were not very successful. Such experiments are at times successful, while at other times they seem to have no effect at all.

Mr. LEVER. I see here that you estimate that the farmers lost \$10,000,000 a year from the depredations of the ground squirrel. How do you arrive at that figure?

Mr. MERRIAM. That is an estimate based on definite facts. We get the facts from different ranchmen and sometimes from county officers, where the county officers supply poisons, and we collate them for the whole area inhabited by ground squirrels. They are approximate estimates, probably considerably under rather than over the actual facts, because there are numerous expenses and losses that we do not get.

Mr. RUCKER. That is based on an estimated number of ground squirrels in that section and the loss from each?

Mr. STANLEY. Have you any of those ground squirrels?

Mr. MERRIAM. No; I did not bring any.

The CHAIRMAN. In regard to making that estimate that Mr. Lever referred to, do you get the amount of loss per acre that a complete infestation would produce and multiply that amount by the total acreage of the area inhabited by the ground squirrel?

Mr. MERRIAM. No; we do not do it that way. We get estimates here and there over the ranges of the various species. In most parts of the West there are from one to three kinds of ground squirrels, and they run from about the size of the field mouse to big mammals almost as large as a rabbit. The big ones do more damage than the others. We get estimates from different parts of the range of the different species and multiply the estimate for each part by the area under cultivation inhabited by that animal. We do not take areas where they are specially destructive or where they are not very destructive.

The CHAIRMAN. Do you think that is a fair estimate? May there not be hundreds of thousands of acres within the area inhabited by these animals, uninvaded acres, upon which there is no damage at all?

Mr. MERRIAM. No. We take into consideration the crops that are raised in those areas. The estimates submitted of the damages caused by different animal pests have been very much cut down and are probably considerably below the facts, rather than above them. In most cases I have cut them in half myself after the figures had been given me.

Mr. RUCKER. You did that because you had some doubt as to the accuracy of the system?

Mr. MERRIAM. Because it was impossible to get exact data, and the figures looked too big, judged without any definite knowledge of the facts. I would rather be on the safe side. I would rather underestimate than overestimate.

The CHAIRMAN. You think you are on the safe side; else you would not publish these figures?

Mr. MERRIAM. Yes; we are sure we are on the safe side. In the case of rats, in Denmark, which is about half the size of the State of South Carolina, the annual damage by rats is stated by the government to be \$3,000,000. In France it is estimated at \$40,000,000, and in Great Britain it is estimated as between \$48,000,000 and \$50,000,000. That is the annual loss from the house rat. The figures that we give are exceedingly low in comparison with those, and I will say right here that in the case of the rat our man insists that the figures should be double what I have given. The insurance people, the board of underwriters, state that the losses from fires caused by electric wires, mainly the result of gnawing by rats and mice, amount to \$15,000,000 a year. I have cut the rats' share of that \$15,000,000 down to \$1,000,000.

Mr. LEVER. What is your estimate of the loss to the country from these rats and mice and ground squirrels and things?

Mr. MERRIAM. About \$110,000,000 is the estimated annual loss.

Mr. LEVER. What is the area of this infection? Is it mostly in the West?

Mr. MERRIAM. It is the whole United States, when you include the rats and field mice. It is the western two-thirds of the United States for gophers and ground squirrels, and the Plains region and adjacent mountains for prairie dogs.

Mr. GILHAMS. Are there any in South Carolina?

Mr. MERRIAM. There are no gophers and ground squirrels in South Carolina.

Perhaps the committee would like to know some that we have suspended on account of shortage of funds. We have

left off work on a lot of projects that we were in the midst of. Work has been suspended, first, on field investigation of damage done by rodents to dikes and dams in irrigation districts, with experiments in destroying the animals. Second, field investigation of damage to forest trees, fruit trees, and nursery stock by rodents—rabbits, gophers, mice, and porcupines, with methods of prevention. I might interpolate in passing that the Forestry Service is very anxious to have us complete this work, and the Reclamation Service is very anxious about other features. The work is very important. In the nurseries that some of the forestry people have established they can hardly raise any young trees because of the damage done by rabbits and field mice in gnawing the newly planted trees. We have tried experiments in coating them with poison and nasty-tasting varnishes, to give them a chance to grow large enough to hold their own. That is an important line of work.

The CHAIRMAN. Doctor, that is a matter that the planters have been working with ever since they began planting trees. Is there a neighborhood anywhere in the country where such methods have not been worked out, of wrapping trees in one way or another, or poisoning the outer surface of them?

Mr. MERRIAM. I do not think there are any parts of the country where some methods have not been used, but most of the methods are expensive and ineffective; our effort is to arrive at methods that are inexpensive and effective.

The CHAIRMAN. Can you suggest some improvements that have been made on the local methods?

Mr. MERRIAM. Our methods have taken the place of the old methods almost uniformly. We have found that in coating trees a certain lime wash is very effective.

Other field work suspended for lack of funds is in connection with the destruction of stocks by wolves, coyotes, and other predaceous animals, including means of prevention. I might say that a year or so ago other bureaus wishing us to cooperate with them would pay the expense of the investigations; but under the act of Congress now in effect that can not be done. We can not now detail a man to the Forest Bureau or to the Reclamation Service and let them pay the cost. The Reclamation Service wanted us to send a man to Yuma to a convention of irrigation engineers now in session there, and offered to pay the expenses, but our law clerk said it could not be done under the existing law.

Then we have suspended fieldwork and experiments in connection with mink, otter, fox, and beaver farming; also fieldwork in the eastern United States in relation to the destruction of berries and other small fruits by birds. We have found in this work that we can very greatly lessen the destruction of orchard crops and fruits by birds by planting wild fruit-bearing species near the orchards, along the hedgerows and fences; planting choke cherries, viburnum bushes, and things of that kind, which are preferred by many birds to the domesticated or cultivated fruits.

As to the experiments in breeding fur-bearing animals, here is an important industry which is still in its infancy—an industry which might be made to yield important revenues. A related industry is the raising of deer for market. This would seem to be a perfectly legitimate occupation, but it is prevented by the laws of many of the

States. The various game laws permit deer to be killed only at certain seasons, and few, if any of them, provide for the sale of domesticated deer. In many parts of the country where land is poor and the woods are full of brush it is said that deer can be raised at almost no cost and that the industry is as profitable as stock raising. But it can not be carried on on account of existing laws, which seems a great misfortune.

Mr. STANLEY. Have you any suggestions to make by which those quasi-domestic deer could be raised and isolated without rendering ineffective the provisions against killing the animal in his wild state?

Mr. MERRIAM. I think so, by labeling with an official tag, as is done now in the beef business. There is room here, I think, for an important industry, by means of which our waste lands that are of no use now to anybody might be made to yield a material income.

We have been forced to suspend field work in Oregon and Washington to ascertain the relation of birds to the fruit industry in those States. (We have already printed a bulletin on the relation of birds to the fruit industry in California.) We have also suspended field work in California with reference to the amount of damage done to grain by wild geese, with a study of methods of prevention. This may seem a surprising statement, but in California thousands of wild geese, of three species, including the great white goose, arrive from the North in early fall and cover hundreds of acres of grain lands, often destroying the wheat. I have seen the ground white for miles with snow geese.

Mr. STANLEY. They are a game bird?

Mr. MERRIAM. Yes. Then we have had to suspend the study of the food of woodpeckers in connection with forest preservation. It is probable that no forest could exist in America but for woodpeckers. Our biological surveys of Alaska, California, North and South Dakota, Oregon, New Mexico, and other States and Territories, including cooperation by request with State officers and organizations, have also been suspended. Our men have been taken off that work because we have had no funds to continue them.

We have finished, Mr. Chairman, a number of projects—for all of our projects do not go on forever. In running over some of the projects this morning, I find that we have completed and published economic studies of the food habits of a number of birds and groups of birds—such as the horned larks, the crows, the English sparrow, the rose-breasted grosbeak, the native sparrows in relation to agriculture, the hawks and owls, the woodpeckers, the quails, the grouse and wild turkeys, the eagles, and the birds of a Maryland farm. Studies have been completed and published also on the migration warblers, the migration and distribution of ducks, geese, and swans, bird migration in the Mississippi Valley, and an economic study of field mice. These projects we have finished. We have finished also several biological surveys, namely, those of northeastern Arizona, south central Idaho, the Death Valley region, the Mount Shasta region, the Yukon region, Alaska, the base of Alaska peninsula, the Hudson Bay region, the Mackenzie and Great Slave Lake region, and the State of Texas. We have already published a fauna of Texas, with a map showing the life zones in that State, and we have nearly completed our biological surveys of the States of Colorado and New Mexico.

In this connection I would like to say, if you will allow me—for we have been criticised for making technical studies—that we could not do satisfactory work in our other lines without a foundation based on these technical studies. We could not tell which mice and which rats and which birds are injurious without knowing the species first. For instance, here are two kinds of mice [exhibiting], one which lives on grasshoppers and beetles and scorpions and injurious insects generally; the other, which lives on seeds and plants and is harmful to agriculture. You see that these animals, of such widely diverse economic habits, resemble one another so closely that they are not easily told apart. And you can easily see that without a knowledge of their habits and modes of life efforts to destroy one would be very likely to destroy the other—that in attempting to stamp out an enemy we should be very likely to kill a friend.

Another case: Here [producing same] are specimens of the house rat, wood rat, and cotton rat—and you see how much alike they are in size and general appearance. And yet their habits are wholly different. The cotton rat is an enemy of the cotton crop and sugar cane, and causes an annual loss of about \$800,000. It is an inhabitant of the hotter parts of the country, and has recently broken out in the Gila Valley in Arizona, as an enemy of the date, which the Department of Agriculture has introduced there. Fortunately it has a limited range.

Mr. LEVER. How is this rat destructive to cotton?

Mr. MERRIAM. It eats the seeds, carrying them into its burrows, and storing them for food, leaving long white paths of cotton along its runways.

The committee then, at 12 o'clock noon, adjourned to meet to-morrow, the 4th instant, at 10 o'clock a. m.

WASHINGTON, D. C., *February 4, 1908.*

The committee met this day at 10.15 o'clock a. m., Hon. Chas. F. Scott, chairman, presiding.

The CHAIRMAN. Gentlemen, when the committee adjourned yesterday we had not yet completed the review of the Bureau of Biology, and I will ask Doctor Merriam to resume his remarks.

STATEMENT OF MR. C. HART MERRIAM, CHIEF OF BUREAU OF BIOLOGICAL SURVEY—Concluded.

Mr. MERRIAM. Mr. Chairman, before we adjourned yesterday we were speaking of the damage done by the different kinds of field mice and meadow mice, and the question of moles was raised. I was asked to bring a specimen. Here is a mole [producing specimen] shown in comparison with one of the common field mice of this region [Washington, D. C.] and also in comparison with another species of field mouse [indicating] which follows the mole runways and eats the roots that the moles are accused of eating.

Last year we were asked to go out a few miles from Washington to investigate damages attributed to moles to see if we could suggest a remedy. Here [exhibiting] are photographs of hyacinth bulbs destroyed along the runways. Our assistant told the people who sent

for us that the animal which did the damage was not a mole, but that it was this mouse—the pine mouse [exhibiting]. He put out some traps and left them there, and going out next day found that they had caught several of the mice. Here is a photograph [producing same] showing one of these mice as caught in a runway.

The moles are insectivorous, and the shrews, of which this [indicating] is one, are related to the mole, and likewise are mainly insectivorous. The mole does a great deal of good and very little harm. It eats the grubs that destroy the roots of many garden crops.

The specimen of pocket gopher which I brought yesterday did not show the external cheek pouches and great teeth which may be seen in this specimen [exhibiting]. The kangaroo rat [exhibiting] is an animal allied to the pocket gopher, but having an enormously long tail. In places it is very destructive to grain and some other crops, but so far as known does not eat roots or tubers. Its food consists almost wholly of seeds. In California last year, in a small valley near the upper San Benito River, kangaroo rats carried off almost the entire wheat crop in their cheek pouches.

The CHAIRMAN. How do the gophers get the food into the external cheek pouches?

Mr. MERRIAM. They do it with a wipe of their paws. The mouth of the pouch has a muscular envelope, which closes it like a sphincter. When they reach their storehouse and want to unload, they relax that muscle. What they did next was a question. Having once kept a live gopher as a pet, I have seen the thing done many times. The animals put their fore paws tight against the sides of the neck and with a rapid forward motion of the paws force the contents of the pouches out. The pouches are not self-emptying.

Here [exhibiting] are photographs showing the gnawed roots of apple trees, gnawed young pines in the pineries, and a stack of roots of the morning glory taken from a storage chamber of one of the meadow mice.

Here also are photographs [exhibiting] of a corn field near Washington in which a number of acres of corn were completely destroyed by common house rats, the rats climbing 7 or 8 feet in order to eat the high ears of corn.

Here also are photographs [exhibiting same] showing the widely different kinds of nests of different species of wood rats, of which I showed specimens of the animals yesterday. These rats do considerable harm in parts of the West, though not nearly as destructive as the gophers and ground squirrels. Some species inhabit the dense redwood forests of the Pacific coast, others the open arid deserts. Their feeding habits vary greatly, according to the areas they operate in. Here [exhibiting] are some of the actual pellets regurgitated by hawks and owls in the Truckee-Carson country, in Humboldt Valley, Nevada. You can see that they are made up of fur and bones of mice. For miles and miles in the Humboldt Valley the ground is strewn with these pellets. There are hundreds of thousands of them—witnesses of the good work done by hawks and owls. Another species of meadow mouse [exhibiting specimen] related to the one that is destroying the alfalfa crop in many parts of the West has recently attacked some of the orange orchards on the east side of the San Joaquin Valley, in California, eating the bark partly off the young trees. Should the mice become abundant there, the damage

they might do would be exceedingly serious. The California orange crop of last year was valued at over \$20,000,000 and more than 30,000 cars were required to ship it East.

Yesterday I spoke of the destruction of rats here in Washington in department stores and was asked to bring the traps actually used in those stores. One of our men, Professor Lantz, went by request to Woodward & Lothrop's, where \$20 to \$50 worth of goods, mainly lace curtains and kid gloves, were damaged each night by rats. He found that the firm had employed dogs and ferrets for ten nights, at a cost of \$100, and had caught only 52 rats; also that they had purchased, at a cost of \$75, 25 ferrets, all of which had escaped. In a few nights, with this simple trap [exhibiting] Professor Lantz caught 146 rats at no cost at all (except for the traps, which was trivial), and the firm has been using these traps ever since. The best bait we have used is Vienna sausage; the next best are eggs, pumpkin seeds, and sunflower seeds.

Mr. WEEKS. Let me ask you: Is that trap on the market and generally known?

Mr. MERRIAM. Yes; it is. It is one of hundreds of rat traps on the market, and it has proved to be the simplest and most successful.

Mr. WEEKS. Do you respond to such a concern as Woodward & Lothrop or private individuals to kill rats, or do any other similar thing?

Mr. MERRIAM. Yes; if we have not previously made an experimental test to show what we can do in that line, and if the place is near by. We send an expert to conduct experiments and establish the success of a particular method. After that we describe the method to other people, as we have done lately in the case of rats in New York stores. We have received appeals lately from several department stores in New York which had heard of the Woodward & Lothrop case. We did not send a man to New York, but simply gave them the method with which we have had so much success. The plague of field mice in the Humboldt Valley is a similar case. We feel that these mice threaten the whole alfalfa industry of the West, and that we ought to strain every resource to make a practical demonstration of the best methods of destroying them, with a view to publishing the results and distributing them widely throughout the affected territory.

I was asked yesterday what kind of animals ground squirrels are, which in the aggregate cause a loss of about \$10,000,000 a year. These animals inhabit about 2,000,000 square miles of the territory of the United States—an area of more than a billion acres. There are many species. All of the animals in this row [exhibiting on table] are ground squirrels. This [indicating] is the Columbia ground squirrel, which in eastern Washington and in neighboring parts of Oregon causes a loss of half a million dollars a year, mainly to the wheat crop. It is the largest and most destructive species. Next to it is the large gray ground squirrel [indicating] of California, in fighting which the people of that State spend \$100,000 a year. Here is another large species [indicating], which operates in Montana and in North and South Dakota, particularly North Dakota. The Franklin ground squirrel [indicating] occupies the upper Mississippi Valley, including the Dakotas and western Minnesota, and reaches South to southeastern Kansas and east to western Indiana. When abundant it is very destructive to wheat.

The common little striped ground squirrel of the Plains reaches eastward into Michigan and westward into Colorado, Wyoming, and Montana. It is very abundant and does a great deal of damage. Another species which does much damage is [indicating specimen] the Townsend ground squirrel, which is extremely abundant in Washington and parts of Oregon. It is relatively easy to kill with bacterial cultures, while the large Columbia ground squirrel [exhibiting], which inhabits the same country, is much harder to kill and seems to be immune from the bacterial diseases.

Here are two species from the desert region [exhibiting same] which are very troublesome to the dikes of the irrigation canals, perforating them much in the same way as the pocket gopher does, and letting out the water.

Mr. RUCKER. I expect the chairman would like to see one of the Kansas products.

Mr. MERRIAM. Here are two from Kansas [exhibiting]—the gray Franklin ground squirrel and the yellowish striped ground squirrel.

The CHAIRMAN. I never saw one of the striped kind.

Mr. LEVER. Have these any economic value?

Mr. MERRIAM. Yes; but they are very little eaten. Their meat is almost as good as that of the tree squirrels, and they are eaten in some parts of the West, but not extensively.

We have maps showing the distribution of the various species of ground squirrels and gophers. We are preparing these maps all the time. The forestry people are anxious to have us help them destroy both ground and tree squirrels and chipmunks, which eat the seeds of the trees which they are planting. Here [exhibiting] are some maps of the National Forests on which the ranges of the different species of squirrels inhabiting those forests are shown.

Mr. RUCKER. Why do you want to kill the tree squirrels?

Mr. MERRIAM. Because they eat the seeds of trees. In cases where the Forest Service has planted hundreds of thousands of seeds of sugar pines and other trees the squirrels and chipmunks have dug them up, so that they could not raise a crop. In this connection we may learn an interesting lesson from the Piute Indians, who preserve pine seeds as one of their staple foods. Pine nuts are to the Piute Indians what acorns are to the Indians of California and what bread is to us. The Piutes make large caches of pine nuts, of which all kinds of squirrels are extremely fond. To protect the pine seeds from the squirrels they take the bark of a desert shrub, a species of *Purshia*, which is very bitter, and make an infusion of it into which they dip the sacks used for the pine nuts. The taste appears to be very disagreeable to the ground squirrels and they let it alone. Possibly the Forest Service may be able to utilize this same method of treating their pine seeds by soaking them in this extremely distasteful solution before planting.

Yesterday, before closing, I enumerated a considerable number of projects of the Biological Survey which had been already closed and entirely finished; also others which we had nearly finished. In addition to those may be mentioned a number of technical studies already completed, namely, studies of the groove-toothed pocket gophers, the pocket mice, the shrews, the weasels, the common bats, the jumping mice, the different genera and subgenera of field mice, the species of field mice, the two-striped skunks, the small spotted

skunks, the wood rats, the white-footed mice, which are distributed everywhere throughout the United States, both East and West, and an index to the genera of mammals.

The CHAIRMAN. Of what economic value have those studies been?

Mr. MERRIAM. They have been, and will continue to be in the future, the foundation for all of our economic work, and for all intelligent work in dealing with mammal pests throughout the country. To attempt to combat the ravages of a destructive animal without knowing what that animal is and without knowing its habits would be like a physician attempting to cure a disease without knowing what the disease is. We can not hope to combat the ravages of an animal intelligently unless we know what the animal is and how it lives, and what its food habits are, and so on. Hence it is absolutely necessary to make technical studies of the animals first in order to find out what they are before we are able to cope with them as pests and before we are able to discriminate between the injurious and the beneficial kinds.

Yesterday I showed some specimens of mice in which there are two groups that resemble one another so closely that an untrained person would have difficulty in telling them apart. One of these mice is beneficial, feeding on grasshoppers, crickets, and other insects all the year round; the other injurious, feeding on seeds and other forms of vegetation and crops.

The CHAIRMAN. Then from your point of view even the most technical scientific work you have done in your bureau has had a real economic utility?

Mr. MERRIAM. Yes. When we began this work in the Biological Survey the birds of the country had been pretty well worked up, so that we knew what they were; but the mammals had not, and no one knew the species. We in the Biological Survey have described probably 600 or 700 new species of mammals and many new genera. When we began very little was known of the mammals. We have had to make these technical studies, but once made they are made practically for all time. All the groups that I have mentioned yesterday and to-day we are done with. Very few groups remain to be worked out; most of them are now finished. The study of the rabbits, the cotton rats, the rice rats, the harvest mice, the grasshopper mice, the ground squirrels, the tree squirrels, and the plain-toothed pocket gophers are nearly finished. That practically winds up the work, although now and then new material makes it necessary to review work done at an earlier date. The technical work, with the maps showing the distribution of the various animals, furnish a foundation for the economic work, and also a foundation for the work on game preservation.

The CHAIRMAN. So that from this time on you can devote a larger share of your energies to combating such of these animals as prove to be pests in various parts of the country?

Mr. MERRIAM. Certainly. The great bulk of mammals are pests. Except the badgers, weasels, skunks, bats, moles, and shrews, very few of our mammals are of service to man. The bulk of the mammals, unlike the birds, are injurious to man, so that we have to fight them; and the first step in fighting them is to find out what they are and what their life habits are.

Mr. POLLARD. Of what benefit is the skunk?

Mr. MERRIAM. It is one of the most beneficial of our mammals. It feeds during its entire lifetime, summer and winter, on insects and mice. Grasshoppers and mice are the principal elements of its food, forming probably more than 90 per cent of its food all the year round. Once in a while a skunk or a weasel takes to killing chickens, and when this happens the guilty animal should be destroyed at any cost. But with skunks, weasels, and foxes it is probably safe to say that fully 99 per cent never touch poultry in their lives. It is a common thing—probably most of you have had cases on your own farms—where skunks and weasels live year after year under some of the out-buildings, under the chicken house, for example, and never touch the poultry, but feed entirely on mice and grasshoppers and the like. Once in a while one individual will take to killing poultry, and if you trap that individual the trouble stops at once.

In my former home in northern New York we had a family of skunks under one of our barns for more than thirty years, and never lost a chicken from them, although there were plenty of chickens there, within reach, all the time.

Mr. POLLARD. I thought the fox always lived on poultry if he could get it. Always around a fox hole you can find a lot of chicken bones. You can even see the foxes come up sometimes and take the chickens.

Mr. MERRIAM. Some foxes do get the poultry habit and ought to be destroyed; but they do not as a rule. It is an interesting fact, and one that has been observed over and over again, that foxes often make their homes close to farm buildings—within a mile or less from farm buildings—going among those buildings every night, and never harming the poultry. They seem to be too shrewd. They seem to know that they would be persecuted if they took to killing poultry.

Mr. COCKS. In my district they have a value in the chase that is appreciated.

Mr. MERRIAM. Those are the red foxes?

Mr. COCKS. Yes.

Mr. MERRIAM. They were introduced there. Introduced animals get all sorts of habits. You can not gamble on the habits of any introduced animal.

In the progress of our biological surveys of different States we have entirely finished Texas and have nearly finished Colorado and New Mexico. I have maps here now of Colorado and New Mexico showing the finished areas.

Mr. POLLARD. Have you done any work in Nebraska?

Mr. MERRIAM. Yes; our biological surveys of Arizona, California, Nebraska, Montana, Nevada, Oregon, Utah, Washington, and Wyoming are far advanced.

The CHAIRMAN. Can you give the committee an idea of what proportion of your lump-sum appropriation you have devoted to these surveys, which you say are now about completed?

Mr. MERRIAM. They are not now about completed, except as I have just mentioned. Some are nearly completed, some are completed, and others not nearly so far advanced. Of the total lump-fund salaries, roughly, about \$7,000 was spent in salaries of men in the field. That is for the year ending June 30, 1907.

Would you like a statement of the expenditures for the year? I have a synopsis of the complete expenditures for the year.

The CHAIRMAN. Showing the different projects undertaken?

Mr. MERRIAM. No; I have not a statement of the different projects. The traveling and general field expenses were \$5,483, the field salaries about \$7,000, making in all something over \$12,000 for field work.

The CHAIRMAN. In making these surveys do you send out a party, or does one man do the work in one section?

Mr. MERRIAM. One man usually does the work, with a teamster or packer who does the cooking and takes care of the horses. There is always one scientific man—a field naturalist. Sometimes that man must have an assistant. The field naturalist must know at least three thousand species of trees and shrubs and mammals and birds. There are not many men who have that knowledge. We have very few such men.

The CHAIRMAN. About how many of such parties do you try to keep in the field?

Mr. MERRIAM. We try to keep from three to five. But we do not always have so many. We have not many men who are competent to take charge of this work, and we have very little money to spend on the field expenses. Personally, I am conducting the work on the west coast, in California, Oregon, and Washington. I am in the field personally about half of every year, and have been for the last twenty years. I consider myself a field man. The best man I have in this line of work is Vernon Bailey, who has completely finished the biological survey of the State of Texas, and published a volume on it, with a colored map which I showed you yesterday. He has also nearly finished New Mexico. We have a young man named Carey who has done the work in Colorado, but he is not well and I am very much afraid that we are going to lose him.

Mr. COOK. He did not contract his illness in Colorado?

Mr. MERRIAM. No, sir.

Mr. POLLARD. Do the State experiment stations cooperate with you in this work?

Mr. MERRIAM. They do in relation to the crop studies, but they do not have specialists who possess the knowledge of species that we need in tracing out the boundaries of areas inhabited by each species, and tracing out the life zones, and so on. There are very few men in the country who can do that work. Certain States have asked us to cooperate with them in biological surveys of their States, but we have been unable to do so for lack of funds.

Mr. POLLARD. The leading colleges all over the country have their biological departments?

Mr. MERRIAM. Yes; but they work on different phases of biology—diseases of stock, and diseases of plants, and so on, and they do a great deal of botanical work, but they are not biologists in the same sense that we are.

Mr. POLLARD. You are practically doing all the work yourselves?

Mr. MERRIAM. Yes. We have done a good deal also in outlying areas, in Alaska and adjacent parts of British America, to complete our map work and find out what our species are.

The CHAIRMAN. Doctor, can you give the committee some examples of the practical use that has been made of your crop-zone work?

Mr. MERRIAM. I think so. I forgot Oregon. Here is a map of our work in Oregon [submitting same] as far as it has gone. It is well along—more than three-quarters finished. Here is a small map

of California. We are working on a very large scale in California, because of the importance of that State horticulturally.

To reply to your inquiry: The work on the life and crop zones is for the purpose of showing the practical farmer what agricultural belt his farm is in, and what crops he can expect to grow, local soils and other local conditions being equal, in order to avoid the enormously wasteful process of finding out by experimentation. Up to very recently many hundreds of thousands of dollars were expended annually, and in some cases millions of dollars, trying to make plants grow in regions which were totally unfitted for them climatically.

I saw a case of that sort a few months ago in southern California where a great deal of money had been expended in setting out and cultivating an almond orchard, which takes years to mature fruit. It was planted in a belt just above the belt in which almonds can profitably thrive, and was a complete waste, and the trees were dying.

The CHAIRMAN. You mean "above" in the sense of elevation?

Mr. MERRIAM. Yes. It was one zone removed from that in which almonds grow. The almonds, and oranges, and figs, and raisin grapes (Muscat grapes), and a number of other valuable crops grow in a definite belt, which is colored orange on our maps [indicating]. In the next belt above, peaches, and apricots, and many varieties of apples and plums, and a number of varieties of cherries grow.

The CHAIRMAN. Do you know whether this man who planted the almond orchard had consulted the Bureau of Soils before planting?

Mr. MERRIAM. He had not. There was no Bureau of Soils in existence then, but it would not have made any difference if he had. He was out of the proper climatic zone for almonds, so the soil would not have helped.

The CHAIRMAN. Does the Soil Bureau of the Department of Agriculture consult you when it is making its soil surveys to ascertain whether a given soil is in a zone that will probably produce a given crop?

Mr. MERRIAM. They do not consult us personally, but they have our maps, which show the results we have attained. For instance, if you have a particular soil in Florida or South Carolina on which a particular crop thrives, and you have that same soil in Maine or New Hampshire or northern Ohio, you know that the crop which thrives on that soil in the South will not grow on it at all in the north, notwithstanding the soil is the same, because the two regions are in different climatic belts. It is our purpose to define these belts, for without a knowledge of the life and crop belts experimental agriculture is extremely expensive and wasteful.

The CHAIRMAN. It is just on that question that I have questioned the utility of your work. You say you might find a soil in Florida that would be suitable for certain crops, and you might find the same soil in Maine, and that anybody would know without being told that the same crop produced in Florida would not be produced in Maine?

Mr. MERRIAM. Yes.

The CHAIRMAN. Is it not measurably so throughout the country? Do you tell the people as a rule that which their common sense does not already advise them?

Mr. MERRIAM. We certainly do, particularly in regions where the zones are near together. If a man is going to settle in Nevada or Colorado or New Mexico, or anywhere else in the West, he wants to

know what crops are likely to succeed commercially on his new ranch; in other words, he wants to know in which crop belt his ranch is situated. He gets that information from our maps, and as the large scale maps are completed, more and more of that important information becomes available. The Reclamation Service asks for the same kind of information. They are anxious to know what will grow in the region of the Klamath irrigation project; what will grow in the neighborhood of the Truckee-Carson project; what will grow in the Phoenix, Ariz., region, in the Salt River and Gila Valleys, and in the Colorado Valley, near Yuma. Our maps show the life and crop zones in which these projects are situated.

The CHAIRMAN. The Bureau of Soil Surveys came before this committee a few days ago and stated to us that when people wanted those things they came to them for information; when they wanted to know if a given crop would grow in a certain place they came to the Soil Survey.

Mr. MERRIAM. That is for minor details of the same kind of information. For example, you can not grow to advantage on a clay soil the crops that grow best on sandy or loamy soils in the same climatic belt. The Biological Survey shows the climatic zones in which the various crops succeed; the Bureau of Soils shows the proper soil for each crop within these zones.

The CHAIRMAN. Do you indicate that from a study of the flora and fauna?

Mr. MERRIAM. Yes. We find that species in nature are strictly limited by climatic conditions, chiefly humidity and temperature; and by studying the distribution of our native animals and plants and making what might be called a composite photograph of a large number of their distribution areas we obtain a resultant which shows the transcontinental life zones.

The CHAIRMAN. Take this case of the almond orchard. What led you to the conclusion that almonds would not prosper there?

Mr. MERRIAM. In traveling through the country I saw by the species of chaparral, without having to stop to trap a mammal or shoot a bird, that the place was in the wrong zone for almonds. But ten miles away we entered the proper zone for almonds. The same thing is true of oranges and other crops. Near the summit of San Geronimo Pass, near Beaumont, land is being advertised for oranges and almonds. The place is on the border line—the doubtful line—for citrus fruits and almonds. It is at best on the overlapping border of two zones, where the climate changes. If it were a little higher orange culture would be out of the question and we could state absolutely that there would be no use in spending money in attempting to grow oranges.

This kind of information is what we are furnishing people constantly. Our maps have been republished by some of the agriculture experiment stations to make them more readily available to the people of their States. They have been published also in three or four of the principal physical geographies of the United States and are used in schools and other educational institutions. They have become an accepted basis for intelligent agricultural work, for work on the distribution of insects and plants, as well as for mammals and birds and reptiles. The insect men and botanists use them in describing the ranges of species without having to go over the ground

in detail. The work has passed the experimental stage. Our results are accepted in this country and abroad, and afford a new basis for describing the distribution of species. For instance, a man in giving the distribution of a plant, instead of requiring several pages to describe the irregularities of the area on which the plant occurs, simply states in a few lines that it inhabits the Transition zone, or the upper half of the Sonora zone; and refers to our zone map or a map of his own, which he prints in the front or rear of his book. This tells the whole story at a glance.

It has been shown that yellow fever in its repeated invasions into the United States occurs strictly within the Austral zone, a zone first shown on a map published by the Biological Survey nineteen years ago, and that many of the diseases of cattle and other diseases are limited to definite parts of particular life zones.

Mr. POLLARD. Do you make a study of such questions as that?

Mr. MERRIAM. No; we do not study diseases. We base our maps on the distribution of birds, mammals, and plants, and these maps have proved useful to other people in the study of other subjects. To say the least, they form the foundation for all intelligent biological work on the distribution of terrestrial animals and plants.

The CHAIRMAN. Can you not describe to the committee just what the colors on that map indicate?

Mr. MERRIAM. Each color represents a transcontinental belt which possesses the same total quantity of heat for the year, and which as a consequence is inhabited by definite associations of animals and plants—for each kind of animal and plant, whether cultivated or wild, requires a certain total quantity of heat for the season of growth and reproduction. The area indicated in orange on our maps [indicating] is called the Lower Austral zone; the area in yellow, which has a lesser total amount of heat, is called the Upper Austral; the blue area, receiving still less heat, is called the Transition zone, and the green areas, receiving such a small quantity of heat that they are of little consequence for agriculture, are called Boreal or Canadian areas.

Mr. POLLARD. Are you speaking of mammals?

Mr. MERRIAM. Yes; mammals, birds, reptiles, and plants. Cultivated plants are merely wild plants tamed, and made more desirable by artificial cultivation. They are subject to the same climatic influences.

Northern forms in going South are interrupted by a different kind of barrier. They can not stand a hot midsummer temperature. The temperature of the hottest six weeks of summer will determine the Southern limit to which a Northern species can go.

Mr. POLLARD. Doctor, do I understand, then, from your discussion of the subject that your men who go out and make these surveys have to have a knowledge of plants and soils as well?

Mr. MERRIAM. Of plants, but not of soils. We pay no attention to soils. That is done by the Soil Survey. Our men must know the different species of birds, mammals, and reptiles when they see them, and also the woody plants. We do not pay attention to annual plants, but chiefly to the trees and bushes, which are permanently located in one spot and can not shift about from year to year.

Mr. POLLARD. What does the subject of plants have to do with biology?

Mr. MERRIAM. Plants are a part of biology. Zoology and botany together make up biology. We have nothing to do with plants from the standpoint of cultivation. We study the distribution of woody plants, which must stay always in the same place. We find them the most convenient landmarks for our work. Wherever we find a tree or a shrub, we know that it has been in that place for many years, and that it is adapted to the average climate of that place. The mammals we have to trap, because most of them live in the ground, and the birds we have to shoot, all of which takes time. Birds are of no account to us in mapping the zones except in the breeding season, for in their migrations they wander over distant areas. So it happens that in mapping the boundaries of the zones, we use the woody plants more than the mammals and birds. The reptiles are stationary, and we use them also. We use every means at our disposal to enable us to do our work quickly, and some of us who have been doing the work for years do it as we travel through the country—afoot, on horseback, or in a buggy. In doing the zone work we rarely stay more than one night in a place, and the lines that we run in a season depend on the distance we can travel, for we map as we go. That is the way the work is done.

The maps, when finished, afford a basis for intelligent crop selection, and also a basis for the warfare against noxious mammals and birds and insects. Doctor Howard will tell you that insect pests introduced from foreign countries, in spreading East and West from the point of introduction, follow exactly the boundaries of the life zones. Twenty years ago I predicted that that would be the case, and a few years later the entomologists found out that it was the case.

Our maps also afford a basis for the discrimination of species, often enabling a person to find out what noxious pest is doing harm in a particular case. By turning to the distribution maps one can see at a glance what animals inhabit a particular region, and of these one can see which species spread over the arid lands, which are restricted to swamp or river lands, and so on, and in that way one may be guided as to which animal is doing the harm.

A case in point was the recent destruction of dates down in the Gila Valley, where the Bureau of Plant Industry found that their dates were seriously damaged. They wanted to know what rat it was that was doing the harm. By turning to our maps we saw that one of the cotton rats inhabited the region bordering the Gila River; and specimens of the date rat, when secured, proved to be this species, and not the wood rat, which abounds on all the deserts of that country.

Mr. BEALL. What practical benefit was that, Doctor, looking to the protection of the crops?

Mr. MERRIAM. One has to know what animal he is fighting in order to fight successfully, the method to be adopted depending upon the habits of the species. The same methods of destruction can not be used against all species, and this is sometimes true even of related species. For instance, among the ground squirrels, the means that will succeed against one will not succeed against another. The bait that will attract one will not attract the other, and the poison that will kill one will not kill the other.

In the work of game preservation, which is one of the branches of the Biological Survey, our maps form the basis for our work and for

legislation in the various States respecting the protection of game. A few years ago there was hardly a State in the Union which did not in its game laws mention species that did not occur in that State at all. That does not happen any more, because our maps show where the different species live.

I have here a map [exhibiting same] showing the distribution of the wild turkey in the United States, and of the great sage grouse of the West, the big sage hen. The yellow on the map shows the distribution of the wild turkey, the blue the distribution of the sage hen. Both are important game birds and both are protected by the laws of the States which they inhabit. Here is a map [exhibiting same] showing the distribution of the different quails—the Eastern quail, the Gambel or desert quail, the California valley quail, and the mountain quail. These game-bird maps were prepared for the benefit of the section of game preservation, so as to enable them to secure proper legislation in the States concerned.

In other bureaus of our Department they form the basis for the distribution of seeds and for the distribution of publications. This is an important item. In the distribution of a publication on prairie dogs, for instance, our maps show the area in which the publication would be useful, and it would not be useful outside. Each map shows at once the area to which a publication on a particular animal should be distributed. The Forest Service in distributing our directions for the destruction of wolves used our maps showing the areas inhabited by wolves and coyotes.

Mr. McLAUGHLIN. In what way are these maps used? If a man is troubled with wolves, he looks on the map to see whether he is right or not?

Mr. MERRIAM. No. We furnished the Forest Service with two maps, one on coyotes and one on wolves, and the Bureau sent the publications in question to the stockmen in those areas instead of sending them broadcast, hit-or-miss, as would have been necessary otherwise, requiring an edition two or three times as big.

The CHAIRMAN. They send those bulletins on request, do they not?

Mr. MERRIAM. No; in this case they were sent to all stockmen in the infested districts. They have lists of stockmen (cattlemen and sheep men), from which they selected those in the wolf-infested regions.

Mr. POLLARD. Is there any duplication of the work of your Department and that of Soils and Plant Industry?

Mr. MERRIAM. None at all. The Bureau of Soils deals with the details of crop distribution on each kind of soil. We ignore those details and study distribution as controlled by climatic conditions.

Mr. POLLARD. I understood you to say a little bit ago that from your map they can tell what particular crops could grow on particular soils.

Mr. MERRIAM. No; I beg your pardon. I said just the contrary. I said that our maps showed which crops could grow in each particular zone, soils and other local conditions being equal. Soil study is an important detail in each section of each zone. We map the zones and their principal divisions as determined by climatic conditions; the Bureau of Soils maps the details of soil distribution and studies soil adaptations to particular crops. It is of little value to a

man outside of the orange belt to know that oranges thrive on a particular kind of soil within that belt, even if that soil occurs on his own farm. The same is true of cotton and rice, the various kinds of grapes, and olives, and all other crops. It does little good to know the kind of soil a particular crop requires if you do not know the climatic requirements also. Our maps show the climatic zones within which certain kinds of crops will thrive wherever the soil and other local conditions are fit, for we have already found that certain conditions of temperature and humidity determine the boundaries of the areas inhabited by different species.

Mr. POLLARD. You take that up in connection with your biological work?

Mr. MERRIAM. Yes. In the field we determine the zone boundaries and the areas inhabited by different associations of species at the same time. The men who are capable of doing this work we keep in the field each year just as long as we have money to keep them, and bring them back to Washington for the rest of the year.

Mr. POLLARD. May I ask, then, whether in this case that you spoke of a bit ago, about this almond grove in California—whether you make observations of that character and then make reports on them?

Mr. MERRIAM. We do not make any particular report on such cases, but we notice cases of that sort, lots of them, every year, in every piece of work that we are doing. I simply mentioned the almond case as a case in point, where a great deal of money was uselessly spent. In this case it amounted to thousands of dollars, spent in trying to make a crop grow in a region where we could have told beforehand that it would not grow.

Mr. POLLARD. Do your experts there give any considerable amount of time to investigations of that kind?

Mr. MERRIAM. No; I simply saw, in passing through the country, along the road, that some one had set out a large almond orchard, and the almond orchard was dying, as he might have been foretold from our maps.

The CHAIRMAN. Your work is of value chiefly and perhaps only in mountain regions, is it not, where crop limitations are apt to be influenced by the altitude? For example, it would not be worth the time and trouble it would take, if this would take any more trouble than riding through on a railroad train, to map a crop zone on your system through States like Illinois and Iowa and Kansas? Do not the people there already know what crops can grow there?

Mr. MERRIAM. Pretty well. Our zone work is of much less value in flat countries than in hilly and mountainous countries. But there is hardly a State in the Union that has not at least two life zones, and most of them three or four. Here is a zone map of the State of Texas, which is ordinarily looked upon as a rather flat State, and yet you see it has parts of five life zones in it.

The CHAIRMAN. Yes; but have not the people already found that out? For example, the people on the Staked Plains would not attempt to raise crops there such as they would raise down at Houston and Dallas?

Mr. MERRIAM. No; but they do not know where the boundary lines are, and many of them do not appreciate the fact that there are boundary lines or belts, and they attempt to make crops grow from 10 to 100 miles away from the area to which they are adapted.

Mr. POLLARD. You seek to establish those boundary lines?

Mr. MERRIAM. Yes; that is our business.

Mr. GILHAMS. Then your maps are useful in the sense that they enable the Bureau of Soils to compare the elements of soil suited to the climatic conditions of the country, as to humidity and temperature?

Mr. MERRIAM. Yes; and to enable the Bureau of Plant Industry, when introducing foreign crops, to know where to put them. A case in point is the introduction of dates down in the Gila country. Our maps show the area of climatic possibility for dates.

Mr. GILHAMS. I notice on that map a line running from the top to the extreme south of Texas. What does that mean?

Mr. MERRIAM. The larger part of Texas is in what we call the Lower Austral zone. That zone has two divisions, the humid and the arid. The humid division reaches from the Sabine River country to about the ninety-eighth meridian and is indicated by the dark area [indicating]. The western or arid division (called Lower Sonoran) lies west of the ninety-eighth meridian and extends to the higher elevations occupied by three other zones.

Mr. McLAUGHLIN. Do not those boundaries change from time to time?

Mr. MERRIAM. No. They have been there for thousands of years and never will change unless the climate of the whole country changes perceptibly.

Mr. McLAUGHLIN. I should think they would change, depending upon the kind of seasons they have and the time when you make examinations. One season might have more rain than another, and one season might have more warm weather or cold weather than another, and those things would bear on your maps, would they not?

Mr. MERRIAM. Those conditions have a bearing on the distribution of annual plants, which we ignore for that very reason, because in a warm season a plant will grow in a climate far too cold for it in average years. So we ignore the annuals and the yearly fluctuations of climate and study instead the trees and shrubs and mammals and birds, which go on unchanged for thousands of years.

There are, however, minor climatic changes which we ourselves are responsible for and which do change the zone boundaries a little from year to year. For instance, the destruction of a forest on a slope facing the south or southwest may change the zone status of that slope for a number of miles. The cutting away of a forest, particularly a coniferous forest, often results in two things—loss of moisture and increase of temperature. Clearing off the forest lets in the sun and dries up the soil, thus increasing the temperature. Evaporation, being a cooling process, tends to lower the surface temperature in dense forests where the supply of moisture is in excess of the loss by evaporation. When the forest covering is removed the soil is immediately deprived of two cooling factors—shade and evaporation. The resulting local increase in temperature often changes the zone and gives a foothold to plants from the zone below; so we often find in cases of the cutting away of forests that the species of a lower zone have invaded the area and that its agricultural adaptations have changed also. Products suited to the zone below will grow in the deforested area and will continue to grow there if the area is kept under cultivation. But if the area is undisturbed it will in time revert

to the original condition. After the new vegetation becomes established, seeds of the original trees (that were there before the land was cleared) are likely to find their way to the place and take root again, and in the course of ten or fifteen years you may see the trees sticking up above the brush, and in twenty years there may be a small forest there, and in fifty or one hundred years the original forest may prevail and the zone may have changed back to the one which originally held the ground. This kind of local zone alternation is continually going on, both as a result of clearing by man and as a result of fires that occur accidentally. I have seen it in the Adirondacks of New York, in the mountains of Pennsylvania, in the Rocky Mountains, and in the mountain country of the Pacific coast.

Mr. LAMB. Have you done any of that map making in Virginia?

Mr. MERRIAM. Yes, but only a little.

Mr. LAMB. Can you tell me why it is that the pippin grows in one neighborhood, and across an undefined line you can not raise that pippin? How do you explain that?

Mr. MERRIAM. The difference is probably a zone difference, a climatic difference. A certain definite quantity of heat and moisture is required by the pippin apple. Wherever it finds that total quantity of heat it thrives, and where it does not it can not be successfully cultivated.

Mr. LAMB. There I see where your work could be of practical value to those people, if you would give those lines so definitely that those people could absolutely know where to raise these pippins and where not to.

Mr. MERRIAM. That is exactly the kind of work we are doing all over the country.

Mr. LAMB. That applies also to cotton. Four counties in Virginia, as you know, now raise cotton, whereas when I was a boy half a dozen counties north of that raised cotton. How has that change taken place in that period of time? Was it because of forest conditions?

Mr. MERRIAM. It may have been.

Mr. LEVER. Doctor, do you have any requests from prospective settlers for your maps and publications and things of that kind?

Mr. MERRIAM. Yes, we do.

Mr. LEVER. Any considerable number?

Mr. MERRIAM. No, not a considerable number, only a few every year. We have had some this year. We have had some inquiries in regard to the Humboldt Valley country, the Truckee-Carson country. We have also had some from Arizona, and some from other States and Territories.

Mr. COOK. Approximately, Doctor, what is the estimate that you ask this committee to grant in the way of an appropriation for the destruction of these pests for the coming fiscal year?

Mr. MERRIAM. We ask for an increase altogether of about \$17,000.

Mr. COOK. What was the appropriation, Doctor, for this year?

Mr. MERRIAM. About \$52,000. That has been the appropriation for several years. There was no increase last year. We are called upon continually by the Forest Service or the Reclamation Service, or by the horticultural people or the live-stock people, to go to particular areas and do particular pieces of work, aiming at the destruction of certain pests or for the purpose of demonstrating to the people how

such pests may be handled, but we have not the means of doing it. Cases of that kind are coming all the time. Just now, in the case of the plague of field mice, which have destroyed completely the alfalfa crop in the Humboldt Valley, Nevada, we are conducting demonstration experiments, in the hope of saving part of the crop near Provo, in Utah, and in other places.

In connection with this work we ought to send a man just as soon as the snow begins to go to all the alfalfa districts of the Western United States, to all the areas infested by these mice, to ascertain present conditions and to show the people how to destroy the animals before they become so abundant as to destroy the whole crop. After the mice have begun to multiply and their natural enemies are gone the destruction will go on so fast that nothing can save the crop—as we have just seen in Nevada. The mice will eat every alfalfa plant and will then eat the bark off the fruit trees. We ought to have a man or several men to send on this errand just as soon as the snow goes. But we have no money to do it with. We are spending all the money we have left on this Humboldt Valley and Truckee-Carson project, at the risk of cutting off our spring field work. Similarly, we ought to send a trained man to the irrigation districts to show the engineers how to destroy the pocket gophers, which are continually causing breaks in the levees—breaks the repair of which costs annually large sums of money. But we can not do it because of lack of funds. For the same reason we have had to decline an urgent invitation to send a man out to attend the engineers' convention, which is in session at Yuma this week.

Mr. LEVER. Did you give the total estimated amount of loss to the country on account of these pests?

Mr. MERRIAM. Yes. The total damage from these mammal pests is about \$110,000,000 a year. I think it is demonstrable that we have saved the stockmen of the West this year more than \$1,500,000, and probably more than \$2,000,000, worth of stock by our methods of destroying wolves; and in the improvement of methods for destruction of pocket gophers and ground squirrels and other pests it is certainly safe to say that we have saved a couple of million dollars more, so that we feel that we have a pretty good outcome for the money expended in this work.

I trust it is understood by the committee that the work the Biological Survey is doing in preparing zone maps of different parts of our country and in preparing maps showing the distribution of the different species and groups of animals serves as a foundation for the more strictly economic work of the Survey and for the work in game protection; that these maps are of service to other bureaus of our Department and to other Departments of the Government, and that the work marks a distinct advance in the general progress of knowledge and education in this country.

The CHAIRMAN. We are greatly obliged to you, Doctor, for the information you have given to the committee.

Now we will pass to the division of accounts and disbursements. I asked Mr. Zappone, the chief of that division, to come before the committee to answer such questions as the committee might wish to ask him and to give us such information as he thinks the committee ought to have.

I notice in the beginning, Mr. Zappone, that you ask for a change in the language by which the chief of division is described, on page 35 of the estimates.

**STATEMENT OF MR. A. ZAPPONE, CHIEF OF DIVISION OF
ACCOUNTS AND DISBURSEMENTS.**

Mr. ZAPPONE. Mr. Chairman, that addition in designation was inserted by the direction of the Secretary. Since I have been placed in charge of the division considerable new work has been assigned to me. It might be well for me to read an order that was issued by the Secretary on February 15, 1906.

The CHAIRMAN. Very good.

Mr. ZAPPONE. (Reads:)

UNITED STATES DEPARTMENT OF AGRICULTURE,
OFFICE OF THE SECRETARY,
Washington, D. C., February 15, 1906.

General Order No. 95.]

Hereafter, with a view of securing uniformity, the chief of the division of accounts and disbursing clerk, as chief financial officer of this Department, will inquire into the receipt and disbursement of all moneys, the auditing of all accounts, the keeping of all liabilities, and the methods of doing business in connection therewith in the various bureaus and independent divisions of the Department of Agriculture, making inspections from time to time, and reporting to me any changes or modifications necessary toward facilitating the public business and safeguarding the moneys of the United States.

JAMES WILSON,
Secretary of Agriculture.

In compliance with that order I have performed the additional duties. Since I have been in charge of the division I have brought about uniformity, I believe, both in the manner of keeping liabilities in the several bureaus and divisions of the Department and in the manner of auditing the accounts.

Under the Secretary's direction, I also have supervision of and examine the accounts of the Forest Service, which has its own fiscal agent. Outside of that particular bureau I pay all the accounts of the Department.

The CHAIRMAN. Outside the Bureau of Forestry?

Mr. ZAPPONE. Yes, outside the Bureau of Forestry I pay all accounts and claims against the Department of Agriculture, and in the Bureau of Forestry I have supervision and inspection over the accounts. At the present time it takes myself and two assistants to make the inspection each month and make a report to the Secretary of Agriculture. As you well know, the Bureau of Forestry has grown very much within the past few years, and it has considerable money coming in the way of receipts from the sale of timber, grazing privileges, and so forth. I suppose in the present year it will aggregate \$2,000,000.

Mr. WEEKS. What is done with that money?

Mr. ZAPPONE. That money comes in, sir, a proper record is made in the books of the Forest Service, and it is then deposited in the Treasury to the credit of "miscellaneous receipts," in accordance with the law which Congress passed last year. Prior to that time it was deposited in the Treasury and used by the Forest Service for the improvement of the Forest Reserves.

Mr. WEEKS. What is it used for now?

Mr. ZAPPONE. Now it is placed in the Treasury to the credit of "miscellaneous receipts," and can only be taken out by the action of Congress. It is like a big sinking fund. If you sell Government property, the money also goes into that fund.

Mr. WEEKS. As I remember it, there were about \$1,500,000 of receipts last year?

Mr. ZAPPONE. Yes, about \$1,500,000, and practically that amount was available on July 1 for the use of the Forest Service. To be more correct, it was \$1,020,000, the balance left over last year. Under the old law that money could be drawn out by the Forest Service and used for the improvement of the Forest Reserves.

Mr. WEEKS. But it can not be under the present law?

Mr. ZAPPONE. No, but under the old plan it could be so used. This year Congress appropriated \$500,000 for that purpose, but said that these receipts must be deposited in the Treasury to the credit of "miscellaneous receipts," so that cut off this source of revenue entirely.

Mr. WEEKS. Do you know how much of that fund is still in the Treasury?

Mr. ZAPPONE. You mean of the old fund available for the improvement of National Forest Reserves?

Mr. WEEKS. Yes.

Mr. ZAPPONE. Yes. My last inspection report showed that there was about \$1,000,000 remaining——

The CHAIRMAN. From the receipts still to the credit of the Forest Service?

Mr. ZAPPONE. I think there is still close to a million dollars to the credit of the Forest Service.

The CHAIRMAN. And yet they have not received anything from that source since the 1st of July last?

Mr. ZAPPONE. They have received such moneys, but they have gone to the credit of miscellaneous receipts.

The CHAIRMAN. I understand that; but they have not received anything that they can use without a Congressional appropriation since the 1st of July?

Mr. ZAPPONE. No; that is not possible since the 1st of last July.

The CHAIRMAN. And there still remains to their credit, according to your understanding, a million dollars in addition to what Congress has appropriated?

Mr. ZAPPONE. Yes, sir; close to that amount; I mean in actual money, sir. Of course, they have made a great many contracts and agreements for fencing and improving the National Forest Reserves. How much of that amount has been set aside for liabilities I can not say. I am passing on the actual condition of the funds——

Mr. STANLEY. At the date of your report?

Mr. ZAPPONE. Yes.

Mr. STANLEY. When was that report made?

Mr. ZAPPONE. The last of December. Every voucher is handled and compared with the books.

The CHAIRMAN. Mr. Zappone, as the disbursing officer of the Department, of course you are entirely familiar with all the checks and precautions that are used to protect the money which is paid out through your hands. Will you not describe briefly for the benefit of

the committee the system which you use? For example, take the case of the agent of any bureau that is sent into the field: How are his expenses kept and accounted for?

Mr. ZAPPONE. Before answering that question, Mr. Chairman, may I finish my answer to the other question? It is not entirely completed.

The CHAIRMAN. Yes. I thought you had completed.

Mr. ZAPPONE. In addition to these new duties I have mentioned, Congress during the past few years has required of our Department several annual reports in regard to expenditures, one of which, commonly termed the Littlefield report, is rather a big undertaking. That is prepared by my division.

The CHAIRMAN. Suppose you describe that report, and let us know just what it involves.

Mr. ZAPPONE. I have brought a copy of the report with me [submitting same], to give some idea of it. Previous to last year this report was printed, after it was compiled by the division of accounts, at an annual cost of about \$5,000. Last year the Committee on Expenditures in the Agricultural Department was of the opinion that that was too much money to pay out for the printing of the report, and suggested that it be prepared by the division of accounts by means of a duplicating process (a rotary mimeograph), 12 or 15 copies to be struck off in that way for the use of the committee; this course was pursued this year, at an expense of about \$100 for the duplicating machine. I am not speaking of the cost of preparation, that is, the clerical help, for the reason that under the new classification of expenditures, which was required by the Committee on Expenditures in the Department, the work of preparing the report was increased, and the cost of preparation increased by at least \$2,000. However, the reduction made in the cost of printing more than offset this increase. This report [indicating] is classified.

Mr. POLLARD. How much less will it cost you to publish the report this year, in the manner you have taken it up, than last year?

Mr. ZAPPONE. I estimate about \$5,000 altogether.

Mr. POLLARD. The expense would be about the same?

Mr. ZAPPONE. No. There has been a saving of about \$5,000. While the mimeograph work is not as neat as I would like to see it, and is not equal to printed work, I believe it will answer the purpose. I had the carpenter fix it on a board with these little clasps here [indicating] so that the report can be leafed over readily.

The CHAIRMAN. Just what does that report show?

Mr. ZAPPONE. That report classifies the expenditures of the Department under the following heads, which the Committee on Expenditures thought would be sufficiently definite and explicit for all purposes: Statutory salaries, lump-sum salaries in Washington, lump-sum salaries outside of Washington, stationery, miscellaneous supplies, and services—equipment, books, machinery, etc.—furniture, fuel, freight, express, telegraph, telephone, rent, cost of electricity, apparatus and instruments and laboratory material, printing and binding, travel, and station and field expenses.

The CHAIRMAN. In every respect it is exactly such a report as has been heretofore published, the only difference being that it appears now in the form you have stated?

Mr. ZAPPONE. Yes; and classified under these heads. Prior to that time it was merely an extract from the cash book, a chronological transcript, one account after the other. The result was that the total amount paid annually to each firm—for example, to William B. Moses & Sons for furniture—could not be ascertained. You would find several hundred items in favor of this firm scattered through the report. From the manner in which the report is now compiled the aggregate amount paid to William B. Moses & Sons from each appropriation is given. The same is true as regards traveling expenses, and the salary received by each employee.

Mr. WEEKS. Then you approve of the suggestions made by the Committee on Expenditures of the Agricultural Department?

Mr. ZAPPONE. Entirely so. They were good suggestions. I keep up this report from day to day by means of a card index. In the course of a year we will have from 20,000 to 30,000 cards, but at any time in the year I can take out an employee's card and determine exactly how much has been paid to him for salary and traveling expenses. I can take out the proper cards and tell you how much has been paid to Wm. B. Moses & Sons, or any other firm. A trial balance can be struck at any time with regard to any particular item of expenditure I have mentioned.

I have here, separately, what I call the "Recapitulation Sheets" of each bureau, from which I can tell you the cost of any one of the enumerated items for each bureau in the past year. That in itself is a very convenient and handy thing to have. We have found it so in our work, and so have the different bureaus.

The CHAIRMAN. Approximately, what does it cost in clerk hire to prepare this report?

Mr. ZAPPONE. I estimate, sir, that it costs about \$7,000.

The CHAIRMAN. To prepare it?

Mr. ZAPPONE. Yes, to prepare it. The cost may be a little less, but it will run pretty close to that figure. That includes the entire work throughout the year, but we should also take into consideration the great advantage of the card system during the year as a reference in looking up any subject and also as a check to prevent the duplicate payment of an account. As it is now, when an account comes in and you take up the proper card to enter it and see a similar entry on the card, the duplication immediately attracts your attention, and you check it up and throw out the account. Such cases occur once in a while. You can not prevent them. Business firms have a way of duplicating their accounts. If a firm sends in an account at the end of the month and for any reason the delivery of the goods is delayed and the account is not paid promptly, it will send in a second account or statement. You can see the danger of duplication, unless there is an excellent check system or safeguard. That apparently answers your question, Mr. Chairman.

Another report, called for by the last Congress, was intended for use in comparison of the expenditures of the past year with what is recommended for the Department in the estimates for the next year. That was quite an undertaking, but I might say that we believe the report is going to be of considerable benefit to the committee, for the reason that it not only gives the recapitulation of these expenditures which are given in the Littlefield report, and which I do not duplicate—except to show as a summary in the beginning—but also gives

the projects undertaken by all the different bureaus and divisions of the Department. All the projects they had in hand during the year 1907 and the cost of those projects are set forth in that report. You will also find in that report what they intend to take up in the way of new projects for 1909, with the money which they have recommended, so far as can be anticipated at this time.

This report deals with the principal projects of the various bureaus. It also gives a summary of the expenditures of the last year, taken bodily from the Littlefield report. I did that to prevent duplication of work as far as possible. Those are the principal items of new work, Mr. Chairman.

Of course I could mention many other items pertaining to fiscal matters. All such matters are now referred to me, many of which were not referred to the division before.

The CHAIRMAN. In connection with the report you have just referred to, for the information of new members of the committee, I might read the paragraph in the appropriation bill (reads):

That hereafter on or before the 1st day of January of each year the Secretary of Agriculture shall submit to Congress, in addition to the estimates now required by law, classified and detailed estimates of every subject of expenditure intended for the Agricultural Department for the next fiscal year, and detailed reports of all expenditures under any appropriation for such service during the preceding fiscal year.

The idea was to give Congress an opportunity to see what a given bureau had expended last year, what it is expending this year, and what it asks to be permitted to spend in the coming year. This is the first time this report has been prepared. I might say also in this connection that at my suggestion the Speaker did not order this report printed. We found it would cost nearly \$5,000 to have it printed. I did not see that it would be of any value or likely to be used in any way by anybody except this committee, and possibly the Littlefield committee, and for that reason it did not seem worth while to undergo the expense of its publication. The information that it contains is valuable to this committee, and available to any members who wish to go into the estimates in great detail. I am rather of the opinion, however, that it does not give this committee new information—information which is not already available to it from other sources—in a sufficient degree to warrant its continuance, because it cost nearly \$5,000. Was not that the estimate you made of the cost of its preparation?

Mr. ZAPPONE. I really have not formed an estimate, Mr. Scott. I think I might safely say the cost would be from \$3,000 to \$4,000, and \$4,000 additional for the printing, if it should be printed.

Mr. RUCKER. This is taken from the books in your office?

Mr. ZAPPONE. Yes; from the books of my office and those of the various bureaus and divisions.

Mr. RUCKER. This is for the typewriting, and so on?

Mr. ZAPPONE. Yes; as many as eight or nine clerks were at work on this report at different times, and they were engaged upon it probably for six weeks.

Mr. RUCKER. I should not think it would cost that much merely for the typewriting.

Mr. ZAPPONE. Of course the matter was not in the books just in this form. The projects were very much condensed. That subject had to be elaborated upon, and many other expenditures also.

Mr. WEEKS. Have you any means of making comparisons between the pay of clerks in the Agricultural Department and other Departments in Washington—clerks doing the same character and grade of work, I mean?

Mr. ZAPPONE. Not from the records of our Department, sir. I was a member of the subcommittee of the Keep Commission which considered that subject, called "the committee on personnel." We did not treat so much the subject of comparison of salaries in the Department of Agriculture with those in other Departments as we did with those of the outside world—private firms and corporate bodies. I think the salaries, so far as the Departments are concerned, are very much alike in the several Departments for the same class of work, with perhaps the exception of those in the War Department and the Navy Department, where the clerks are probably paid lower salaries than the clerks in most of the other Executive Departments. But outside of those two Departments the Executive Departments are practically on a par as regards salaries and character of work rendered for those salaries.

Mr. WEEKS. Have you any idea of the number of clerks employed during the last calendar year by the Agricultural Department who had been previously employed by other Departments?

Mr. ZAPPONE. Not a definite idea, sir. Quite a number have come to our Department from other Departments in the last fiscal year, as a result of the large appropriation of \$3,000,000 for meat inspection and the large appropriation of \$500,000 for food and drug inspection. The disbursement of these appropriations necessitated the employment of a large number of additional clerks, most of whom were obtained from the Civil Service Commission, and some by transfer from other Departments.

Mr. WEEKS. Were the transfers made because the clerks would receive higher pay in the Agricultural Department, or was it a kind of work that was more agreeable to them?

Mr. ZAPPONE. For both reasons. In some cases the transfers carried promotion. That was the only condition under which the clerks would be willing to be transferred. I think that the Department thought it was better to get trained men, men it actually needed to take up any work, than to request certifications from the Civil Service Commission and get men that it had never seen and of whose work it had no knowledge at all.

Mr. WEEKS. Do you think it is good business policy to transfer clerks from one Department to another?

Mr. ZAPPONE. Not as a general business proposition; but there are times when transfers are absolutely necessary. If there is a man in one Department who is peculiarly fitted for a certain line of work in another Department that man should be transferred for that work, either with or without a promotion. The question was pretty thoroughly thrashed out last year before the Littlefield committee, and it was generally accepted and agreed that in certain cases, where men had technical knowledge or were peculiarly fitted along a line of work which some particular Department wished to take up, it was to the public interest to transfer those men to that Department, even at increased salaries. But as a general proposition I think the salaries in all Departments should be, as far as possible, on a par, with promotions as rapid in one Department as in another, so that the desire

to be transferred from one Department to another should not exist. I do not think it is a good business proposition to transfer promiscuously; but in certain cases I think transfers are advisable.

Mr. WEEKS. Could you furnish the committee, without any considerable trouble, the number of new clerks employed in the last calendar year, and indicate those clerks who came from other Departments, and what salary they are receiving now and what salary they received before?

Mr. ZAPPONE. Yes, sir; if you will give me a few days.

Mr. WEEKS. I would like to have that information.

The CHAIRMAN. We will be very glad to have that information, and Mr. Zappone could perhaps include it in his statement when he approves the reporter's notes. When he comes to revise, at this place he can insert that information.

Mr. ZAPPONE. Answering the foregoing question, I find, from information obtained from the appointment clerk of this Department, that the total number of permanent appointments to positions in the Department of Agriculture during the calendar year 1907 was 1,873, of which number 1,806 were made from certifications issued by the Civil Service Commission and the remaining 67 by transfer from other Departments to the Department of Agriculture.

The following tabulated statement shows in detail, as requested, the employees transferred from other departments to this Department during the calendar year ended December 31, 1907:

List of persons transferred to the U. S. Department of Agriculture from the various other departments during the calendar year ended December 31, 1907.

| Date of transfer. | Name. | State. | Transferred from— | | | Transferred to— | | |
|-------------------|-----------------------------|-----------|---------------------------------|--|-----------------------------|-------------------|--------------------------------|-------------------------------------|
| | | | Department. | Bureau or Office. | Position. | Salary per annum. | Bureau or Office. | Position. |
| Jan. 2 | Henry C. White..... | Mass..... | War..... | Philippine Service..... | Clerk..... | \$1,600.00 | Bureau of Animal Industry..... | Clerk stenographer, and typewriter. |
| 2 | Benjamin H. Gibbs..... | Md..... | do..... | do..... | do..... | 1,600.00 | do..... | do..... |
| 18 | Peter J. Keisher..... | N. Y..... | Treasury..... | Public Health and Marine-Hospital Service..... | do..... | 1,200.00 | do..... | Clerk..... |
| 25 | Christopher Fitzgerald..... | Cal..... | Commerce and Labor..... | Coast and Geodetic Survey..... | Watch officer..... | \$130.00 | Forest Service..... | Surveyor..... |
| 7 | Harry Bryan..... | D. C..... | Navy..... | Navy-yard..... | Second-class machinist..... | \$3.12 | Bureau of Soils..... | Mechanician..... |
| 11 | E. D. Morgan Fowle..... | N. Y..... | Interior..... | General Land Office..... | Clerk..... | 1,200.00 | Office of Secretary..... | Clerk stenographer and typewriter. |
| Feb. 1 | Walter Sorrell..... | Ala..... | War..... | Philippine Service..... | Meat inspector..... | 1,800.00 | Bureau of Animal Industry..... | Veterinary inspector. |
| 4 | William M. Maule..... | Pa..... | do..... | do..... | Forester..... | 2,200.00 | Forest Service..... | Forest assistant. |
| 2 | Percy L. Gladmon..... | D. C..... | Smithsonian Institution..... | National Museum..... | Clerk..... | 600.00 | Office of Secretary..... | Clerk..... |
| Mar. 25 | George L. Jeffry..... | Wia..... | Government Printing Office..... | do..... | Compositor..... | \$4.68 | Forest Service..... | do..... |
| 26 | George F. Pollock..... | Ohio..... | Interior..... | General Land Office..... | Chief clerk..... | 2,500.00 | do..... | Clerk-examiner..... |
| 21 | John W. Frole..... | Tex..... | Navy..... | Hydrographic Office..... | Computer..... | 1,600.00 | Bureau of Plant Industry..... | Executive assistant. |
| 1 | James G. Shibley..... | Kans..... | War..... | Surgeon-General's Office..... | Clerk..... | 1,200.00 | Bureau of Chemistry..... | Clerk stenographer, and typewriter. |
| 18 | William H. Rose..... | N. C..... | Interior..... | Office of the Secretary..... | Fireman..... | 720.00 | Office of Secretary..... | Assistant measurer. |
| Apr. 22 | Benjamin H. Dutrow..... | Md..... | Navy..... | Bureau of Construction and Repair..... | Clerk..... | 1,200.00 | Forest Service..... | Clerk..... |
| 1 | Jennie G. Hoey..... | La..... | Government Printing Office..... | do..... | Folder..... | \$2.00 | Division of Publications..... | Skilled laborer..... |
| 24 | Louisa K. Locke..... | S. C..... | do..... | do..... | Operator..... | c. 25 | do..... | do..... |
| May 9 | William K. Blessing..... | Pa..... | War..... | Philippine Service..... | Clerk..... | 1,400.00 | Forest Service..... | Clerk..... |
| 11 | Joseph G. Falck..... | D. C..... | Treasury..... | Division of Mails and Files..... | do..... | 1,000.00 | do..... | Property clerk..... |
| 29 | James W. Dilley..... | Utah..... | War..... | Philippine Service..... | Clerk-bookkeeper..... | 1,500.00 | Forest Service..... | Clerk-bookkeeper..... |
| 2 | Francis M. McLaughlin..... | Iowa..... | Civil Service Commission..... | do..... | Clerk..... | 1,000.00 | Bureau of Plant Industry..... | Clerk..... |
| 16 | John H. Garber..... | Iowa..... | Commerce and Labor..... | Bureau of the Census..... | do..... | 1,800.00 | Bureau of Chemistry..... | Food and drug inspector. |
| 8 | August Euehne..... | Ill..... | Government Printing Office..... | do..... | Helper..... | c. 25 | Division of Publications..... | Skilled laborer..... |
| | | | | | | * Per day. | | |
| | | | | | | * Per hour. | | |
| | | | | | | * Per month. | | |

AGRICULTURAL APPROPRIATION BILL.

List of persons transferred to the U. S. Department of Agriculture from the various other departments during the calendar year ended December 31, 1907—Continued.

| Date of transfer. | Name. | State. | Transferred from— | | | Transferred to— | | |
|-------------------|---------------------------|-----------|-----------------------------|----------------------------------|--------------------------------|-------------------|---|-------------------------------------|
| | | | Department. | Bureau or Office. | Position. | Salary per annum. | Bureau or Office. | Position. |
| June 1 | Frederic A. Young..... | N. J..... | Commerce and Labor. | Coast and Geodetic Survey. | Assistant..... | \$1,600.00 | Weather Bureau..... | Research observer.. |
| 10 | Theodore A. Hunter..... | Ky..... | War..... | Philippine Service..... | Bookkeeper and accountant..... | 1,200.00 | Bureau of Animal Industry..... | Tagger..... |
| 3 | Dabney C. Harrison..... | I. T..... | Interior..... | Geological Survey..... | Topographer..... | 1,800.00 | Forest Service..... | Topographer..... |
| 3 | Charles C. Bassett..... | D. C..... | do..... | do..... | do..... | 1,800.00 | do..... | do..... |
| 12 | William F. Staley..... | Mich..... | do..... | General Land Office..... | Clerk..... | 1,600.00 | do..... | Clerk..... |
| 17 | Consuela Adamson..... | Md..... | Government Printing Office. | do..... | Skilled laborer..... | a. 25 | do..... | Skilled laborer..... |
| 14 | George W. Morrison..... | D. C..... | Interior..... | General Land Office..... | Clerk..... | 1,000.00 | Bureau of Plant Industry..... | Clerk stenographer, and typewriter. |
| 8 | Emma L. Trudeau..... | La..... | Government Printing Office. | do..... | Folder..... | a. 25 | Division of publications. | Skilled laborer..... |
| July 1 | John H. Bridges..... | Fla..... | War..... | Philippine Service..... | Forest assistant..... | 1,400.00 | Forest Service..... | Forest assistant..... |
| 19 | Albert H. Coumans..... | Mass..... | Post-Office..... | Office of chief inspector. | Post-office inspector. | 1,400.00 | do..... | Clerk..... |
| 1 | Albert T. Mitchelson..... | Ga..... | Interior..... | Reclamation Service. | Junior engineer..... | 1,440.00 | do..... | Assistant engineer..... |
| 16 | Simon Busch..... | Minn..... | Navy..... | Bureau of Supplies and Accounts. | Clerk..... | 1,000.00 | do..... | Clerk..... |
| 1 | Henry F. Haase..... | N. J..... | War..... | Engineer Department | Assistant gardener. | \$ 57.50 | Bureau of Plant Industry..... | Gardener..... |
| 8 | Ira G. Phillips..... | Wis..... | Post-Office..... | Mail bag repair shop. | Leather worker..... | a. 3.50 | do..... | Skilled laborer..... |
| 17 | Syma T. Cabell..... | Als..... | Navy..... | Bureau of Supplies and Accounts. | Clerk..... | 1,200.00 | Bureau of Chemistry. | Clerk..... |
| 27 | Robert S. Hiltner..... | Nebr..... | Treasury..... | Customs Service..... | Chemist and examiner of drugs. | 2,000.00 | do..... | Assistant chemist..... |
| 8 | Frank W. Vedder..... | Cal..... | Interior..... | Secretary's Office..... | Copyist..... | 900.00 | Bureau of Entomology. | Clerk..... |
| 1 | Ernest L. Hammargren. | Fla..... | Commerce and Labor. | Bureau of Statistics..... | Clerk..... | 1,200.00 | Bureau of Statistics..... | do..... |
| 1 | Mary K. Hemingway..... | D. C..... | Government Printing Office. | National Museum..... | Folder..... | a. 25 | Division of publications. | Skilled laborer..... |
| 1 | S. Benson Walker..... | Md..... | Smithsonian Institution. | do..... | Skilled laborer..... | 360.00 | Division of accounts and disbursements. | Messenger..... |
| June 17 | Philip R. Tavenner..... | D. C..... | do..... | Astrophysical Observatory. | Fireman..... | \$ 80.00 | Office of Secretary... | Assistant fireman..... |
| Aug. 21 | Norman L. Downs..... | Dal..... | War..... | Philippine Service..... | Disbursing clerk..... | 1,800.00 | Forest Service..... | Clerk..... |
| 6 | Charles W. Reed..... | Pa..... | do..... | Quartermaster-General's Office. | Clerk..... | 1,400.00 | Bureau of Plant Industry..... | do..... |
| 1 | Royal T. McKenna..... | N. Y..... | Interior..... | Bureau of Pensions..... | do..... | 1,200.00 | Bureau of Statistics..... | do..... |

AGRICULTURAL APPROPRIATION BILL.

573

| | Mo. | do. | Government Hospital
for the Insane. | Librarian | Library | | |
|----------|-----------------------------|------------------------|--|--------------------------|--|---|----------|
| 16 | Audrey Goss. | do. | Philippine Service. | Disbursing officer. | Library | do. | 840.00 |
| 3 | Walter L. Shuck. | War | | | Division of accounts
and disbursements. | do. | 720.00 |
| 16 | Siegfried O. Graser. | Gov. Printing Office. | | Bookbinder. | Office of Secretary. | Skilled laborer. | 600.00 |
| Sept. 10 | Talbot O. Pullizzi. | Commerce and
Labor. | | Clerk. | Bureau of Chemistry. | Clerk. | 1,300.00 |
| 1 | William D. Wright. | War. | Coast and Geodetic
Survey. | Veterinarian. | Bureau of Animal
Industry. | Veterinary in-
spector. | 1,400.00 |
| 1 | Samuel A. Jones. | Navy. | Philippine Service. | Clerk. | Bureau of Statistics. | Chief clerk. | 1,800.00 |
| 13 | Lafayette B. Eaton. | Treasury. | Bureau of Supplies
and Accounts. | do. | Office of Secretary. | Clerk. | 1,400.00 |
| Oct. 10 | Joseph V. Work. | Treasury. | Life-Saving Service. | Assistant En-
gineer. | Forest Service. | Assistant engineer. | 1,800.00 |
| 28 | Andrew H. Carrico. | Treasury. | Reclamation Service. | Clerk. | do. | Clerk. | 1,200.00 |
| 29 | Blanche Todd. | Gov. Printing Office. | Office of Auditor for
Post-Office Dept. | Folder. | do. | Classified laborer. | 600.00 |
| 16 | S. Helen Yonce. | Commerce and
Labor. | Bureau of Census. | Clerk. | Bureau of Statistics. | Clerk. | 1,000.00 |
| Nov. 2 | Sarah E. Gedney. | Interior. | Indian Service. | Teacher. | Forest Service. | do. | 600.00 |
| 7 | James H. Kerrick. | Navy. | Bureau of Supplies
and Accounts. | Clerk. | do. | do. | 1,200.00 |
| 5 | Alice R. McFadden. | Gov. Printing Office. | | Folder. | do. | Classified laborer. | 600.00 |
| 7 | John S. Swan. | Treasury. | Office of Auditor for
State and other De-
partments. | Clerk. | do. | Clerk. | 1,400.00 |
| 18 | Frederick D. Brad-
ford. | Post-Office. | | do. | do. | Copyist, topog-
raphic drafts-
man. | 1,000.00 |
| 18 | Haddie Z. Costery. | Gov. Printing Office. | | Folder. | do. | Classified laborer. | 600.00 |
| 10 | Mary S. Dulin. | do. | | Sewer. | Bureau of Plant In-
dustry. | Skilled laborer. | 600.00 |
| Dec. 1 | Clarence Wiley. | Navy. | Bureau of Supplies
and Accounts. | Clerk. | Forest Service. | Clerk. | 1,200.00 |
| 26 | William H. Barbour. | Gov. Printing Office. | | Helper. | Division of publica-
tions. | Skilled laborer. | 600.00 |

c Per day.

b Per month.

a Per hour.

Total number, 67.

From the foregoing statement it will be seen that of 67 transfers from other Departments to the Department of Agriculture during the calendar year 1907, 21 were attended with promotions averaging \$175.90, 27 were at the same salary, and 19 were attended with reductions averaging \$454.95. In other words, disregarding the 27 transfers at the same salary, there was a net average reduction of \$123.75 in the remaining 40 cases of transfer.

Mr. LAMB. May I ask you, is there any difference in the pay of the clerks in your Department and other Departments that you know of where like work is done?

Mr. ZAPPONE. Absolutely none, except in the two Departments I have named, the War Department and the Navy Department. After a great deal of discussion before the subcommittee of the Keep Commission I mentioned, I feel that I can consistently make that statement. But it is a well-known fact that under the military discipline of the War and Navy Departments—I think it is due partly to that—the salaries of the clerical force have been kept down somewhat, and also for the reason that the salaries of second lieutenants and other junior officers, who are often in charge of certain lines of work and offices, are not very high, as you know.

The CHAIRMAN. Can you tell us what the salaries of chief clerks in the bureaus of the Department of Agriculture and other bureaus are and how they compare?

Mr. ZAPPONE. The salaries of chief clerks in the Department of Agriculture are quite low. Taken as a whole, I think that the chief clerks in other Departments receive more money. We have chief clerks in bureaus and divisions of our Department getting as low as \$1,600 and \$1,800. For instance, the chief clerk of the Bureau of Chemistry gets \$1,600. He has been recommended to receive \$1,800.

Mr. STANLEY. Is not that a very important post?

Mr. ZAPPONE. Yes. A large number of food and drug inspectors recently added to their rolls increases the executive work of that Bureau to a great extent. The importance of a chief clerk's position depends entirely upon the personnel and the number of men employed in a bureau or division. In another case, in the Bureau of Entomology, the chief clerk gets only \$1,800; as is likewise the case in the Bureau of Statistics and in the Office of Experiment Stations. There also the chief clerks get only \$1,800 each. That is the grade of a clerk of class 4, established by Congress away back in 1853, when they established the four grades of clerks of classes 4, 3, 2, and 1. A chief clerk may oftentimes have several clerks of class 4 under him. In the largest bureau in our Department, the Bureau of Animal Industry, the chief clerk gets only \$2,000. In the Weather Bureau the chief clerk gets \$2,250, and in the Bureau of Plant Industry \$2,250. In the Forest Service the gentleman acting as chief clerk gets \$1,900.

Now take the chief clerk of our Department. He gets \$2,500, while the chief clerks of all other Departments get \$3,000. The Secretary of War, in his official estimates for next year, has recommended \$4,000 for his chief clerk. The Secretary of State, I understand, in a supplemental estimate, has recommended \$4,000 for his chief clerk. The Secretary of the Treasury, according to the urgent deficiency bill and the general estimates, has estimated \$3,500 for his chief clerk for next year. As already stated, the chief clerk of

our Department gets \$2,500. That shows how the salaries of our chief clerks compare, I think, with those of other Departments.

The CHAIRMAN. How do the salaries of disbursing officers in the various Departments compare?

Mr. ZAPPONE. In answering that question I desire to state that in some of the Departments a disbursing clerk is no more than a paying teller, who merely disburses money and does not audit the accounts; in fact, has nothing to do with them. He may have half a dozen or possibly 8 men under him. Such is the case in the Treasury Department. That Department has two disbursing officers at \$2,500 each. They have just been recommended by the Secretary of the Treasury for \$3,000 each. They are not chiefs of divisions, nor do they audit the accounts. In the Department of Justice the disbursing clerk gets \$2,750, in addition to whom there is a chief of the Division of Accounts, who gets \$2,500, making the total for that work \$5,250, which work is all concentrated in my division in the one place. In the Interior Department the disbursing clerk gets \$2,250, and he also gets \$1,000 for paying off the force of the Superintendent of the Capitol. That makes it \$3,250. He has just been recommended for \$250 additional, which will make it \$3,500. The disbursing clerk of the Department of Commerce and Labor gets \$2,750. In the Government Printing Office, which seems to be in the public eye at the present moment, the accounting officer gets \$3,600 and the paymaster \$2,500. That makes \$6,100.

All these duties are performed in my division, and naturally I have a larger force to supervise. I could not manage the fiscal affairs of our Department with eight or ten men. We have 31 men, but we do the entire work and give every account a thorough examination before it is paid.

Each bureau makes the preliminary audit and checks up the account to see that it has been regularly authorized—if it is a salary account, to see that the man has been employed all through the time; to see that he has not been granted leave without pay; in the case of traveling accounts, to see that he has not delayed unnecessarily in making a trip across the country—after which checking up, the account is sent to me by the chief of bureau for payment, and I give it a thorough administrative examination, under the instructions of the Secretary and as required by law, to see that it was regularly authorized and to see that all the technicalities of the Treasury have been fully covered as to the expenditures involved. Matters of administrative policy, like a delay en route, with an explanation by the chief of the bureau in approving it, I do not question. Those are passed because they pertain to what we call “administrative policy.” The actual expenditure of the money is under the chief of the bureau. He is charged by the Secretary to see that that is properly expended. The account is then paid. I think that answers your question fully, Mr. Chairman.

AFTERNOON SESSION.

The committee met at 2 o'clock p. m., Hon. Charles F. Scott (chairman) in the chair.

STATEMENT OF MR. A. ZAPPONE—Continued.

The CHAIRMAN. Will you resume where you were interrupted, Mr. Zappone?

Mr. ZAPPONE. I finished that particular question, Mr. Chairman.

The CHAIRMAN. You had been speaking, I believe, of the precautions that were taken in your office to guard against errors in payments—any kind of errors in the disbursement of the funds. I think, perhaps, you might discuss the matter in a little closer detail to the advantage of the committee. Suppose you just give a typical account and follow it through.

Mr. ZAPPONE. Under the law, at the beginning of each fiscal year the head of each Department is required to allot the appropriations made by Congress by quarters to the various bureaus and independent divisions of his Department.

The CHAIRMAN. That is done to guard against possible deficiencies?

Mr. ZAPPONE. That is done to guard against a deficiency; and each year, just prior to July 1, the various bureaus and divisions are called upon to make recommendations as to how their appropriations should be allotted. A statement is then prepared and submitted to the Secretary for his approval, and when approved the various bureaus and divisions are advised, and their expenditures are made in accordance with the allotments approved. I merely mention that because I feel that we should first allot the money before we take up any case as an illustration. I would like to pass this (exhibiting paper) around the table; it is the allotment of the funds for the present fiscal year—the official paper that is on file in my office.

Mr. POLLARD. You say for the present fiscal year?

Mr. ZAPPONE. For the present fiscal year. The next step after allotment, when an expenditure is necessary, is for the chief of the bureau or independent division to make a request on the Secretary that a letter of authorization be issued authorizing an expenditure for the desired purpose, whether it be for a travel trip to be made by some employee or for the purpose of taking up some project such as has already been mentioned to your committee. That request is sent to my office, and I prepare the letter of authorization for the signature of the Secretary, first comparing the request with the appropriation act to see whether the language of the law covers such expenditures. If there is any doubt, I refer the request to the solicitor of the Department for a legal opinion. That, in a way, will answer your question, sir. The letter is then issued and sent to the bureau or division concerned, and if it authorizes a journey on the part of an employee, the necessary passenger transportation request is furnished to him and he starts on the trip, paying his expenses en route in cash, and making a memorandum thereof for future reimbursement.

Mr. POLLARD. Do the railroads ever furnish free transportation to your corps of men?

Mr. ZAPPONE. In some cases they do, where the travel is strictly within one State. Under the rate law a railroad may not give a pass,

but as I understand it within a State this is possible. There is no specific language against it, and a railroad operating entirely within a State has the right to do in that State what it wishes.

The CHAIRMAN. Subject to State laws.

Mr. ZAPPONE. Subject to State laws, of course.

The CHAIRMAN. Have you any record in your office which would show even approximately the increase in the expenses of the Department of Agriculture due to the operation of the rate bill?

Mr. ZAPPONE. I have, sir; one I compiled last year. The increase was \$80,000, due principally to the stock examiners of the Bureau of Animal Industry traveling from State to State.

Mr. LAMB. This is very suggestive.

Mr. POLLARD. \$80,000?

Mr. ZAPPONE. \$80,000, the major part of which was expended by that Bureau. Since the passage of the rate bill the amount covered by passes has been very small. As I say, it is only within a State, where the work of these stock examiners is strictly, and you might say absolutely, for the benefit of the railroads that passes may be used. When shipments of meat move along their routes, they telephone to the nearest stock examiner of the Bureau of Animal Industry and have him meet the car. He goes along with the car or examines it prior to the placing of meats therein.

Mr. LAMB. That is entirely within the State, though?

Mr. ZAPPONE. Entirely within the State, and I think I can safely say that a few such passes are still granted within the State, but not for interstate journeys in any way, because that is contrary to the rate law.

Mr. LAMB. This \$80,000 is now spent by the Government where you formerly had passes; those passes were interstate?

Mr. ZAPPONE. Interstate, with very few exceptions, and the purchase of interstate tickets became quite a heavy drain on our appropriation. To offset that in a way the appropriation act of last year contained a provision permitting the Secretary of Agriculture to buy mileage books and thus reduce the cost of transportation quite materially. In other words, the average expense is now from 2½ to 3 cents a mile, with a rebate on the return of the cover. The use of mileage books involves a considerable increase of clerical work in my division. I must keep a journal record of all mileage books purchased, charge them against the men, and see that when the book is exhausted we get the rebate on the cover. That rebate, which is always paid in money, is deposited in the Treasury to the credit of the appropriation, and can be used again.

Mr. POLLARD. May I ask you whether you have any knowledge of the amount of money that the Government pays for all of the various Departments of the Government for transportation?

Mr. ZAPPONE. All of the Departments?

Mr. POLLARD. Yes.

Mr. ZAPPONE. I have not. I can give you that for the Department of Agriculture.

Mr. POLLARD. How much is it for this Department?

Mr. ZAPPONE. For the Department of Agriculture the amount expended for travel and for station and field expenses during the past year—

Mr. POLLARD. That is all right. Do you separate the amounts there—that is, the amount paid for transportation and the amount paid for traveling expenses?

Mr. ZAPPONE. No, sir; it is all included under one head.

Mr. POLLARD. It is all included?

Mr. ZAPPONE. The transportation will come in from the railroad companies, but is charged up under the head of travel.

Mr. POLLARD. You have not it separated?

Mr. ZAPPONE. I have not separated it. I can not tell you the exact amount for railroad travel and the exact amount for reimbursement of incidental expenses, because many reimbursement accounts contain items for short travel trips. An employee may be out of the Government transportation requests, and pay for a short journey in cash—in fact the regulations of the Department require him to pay cash for all journeys under 100 miles. Often when he is on the road and his supply of Government passenger requests is exhausted, he will have to pay for his journey from one point to another. You can readily see that when a reimbursement account contains 100 or possibly 200 items, it would be a very difficult matter to pick out all the little items of transportation and keep them separate. In addition to this, the Littlefield committee wished to have travel and station and field expenses kept together so that they could tell just how much money was paid to each employee for salary, and how much was paid to him for all other expenses, including railroad fares. The two sums gave the total amount paid to each employee.

The CHAIRMAN. When an employee uses a Government request, for transportation, he does not pay cash?

Mr. ZAPPONE. He pays no cash.

The CHAIRMAN. The company forwards that request with a bill for the ticket, and you settle with the company?

Mr. ZAPPONE. Exactly, sir. The agent forwards these requests to the auditor of his company, and once a month the company renders an account to the Government. A voucher may have 50 or 100 requests attached to it as a single account, and may involve any number of appropriations in the Department; but by our system of bookkeeping we handle it as one account and pay it by one check, which facilitates matters very much.

To return to the total cost of travel and reimbursement of incidental expenses, the amount for the fiscal year ended June 30, 1907, the past fiscal year, was \$728,358.29. As previously mentioned, an employee keeps a memorandum of the amounts paid by him in cash while traveling, and upon return to headquarters prepares an account on the regular blanks of the Department provided for that purpose. After a report of the journey is made to the chief of bureau, the travel account is checked up with the records of the bureau to ascertain whether the expense was properly authorized by a letter of authority from the Secretary, and whether there have been any undue delays on the part of the man while en route. The account is then entered in the liability books of that bureau, approved by the chief, and sent to me for payment. Before payment, it is given an administrative examination by my auditors, to see that all of the little technicalities of the Treasury Department have been fully

covered, and that no expense not properly authorized by the fiscal regulations of our Department has been included.

We have a printed publication known as the "Fiscal Regulations" of the Department, which are the Secretary's orders as to what an employee shall expend for meals and lodgings while out on a trip, what he shall expend for the transportation of baggage, for porter's tips, and everything of that character. My orders from the Secretary are to see that everything is in accordance with the "Fiscal Regulations." After that a check is drawn.

At the end of the quarter I make out what is termed an abstract of expenditures under each appropriation. If we have fifty appropriations, I make out fifty abstracts of expenditures. Each abstract is nothing more than a transcript from my cash book of every item expended during that quarter against that particular appropriation. After that is made out I make up what is termed a combined account current, which is a single sheet of paper containing all the appropriations of the Department, and on which every financial transaction by me during the quarter is entered. Amounts advanced to me by the Treasury are also entered, for the account current is a regular debit and credit account with the United States. I sign the account current and the abstracts and submit them to the Secretary on the 20th following the last day of the quarter to which the accounts belong, as required by law. Before approval the abstracts are referred to the chief of each bureau of the Department to check up with the records in his liability books to see whether every account he has sent to me has been actually paid, and paid for the amount approved by him. If not, his assistant comes over and examines the records and vouchers in my office. Under a general order of the Secretary issued in regard to the matter, the clerk who checks up these accounts in each of the different bureaus must be one who has had nothing to do with the original auditing of the accounts. He goes to the records, and checks up every item on the abstract, so that there is an excellent double check and administrative examination of every account paid by the Department of Agriculture. I do not hesitate to say that that statement was made by the chief of the miscellaneous division of the auditor for the State and other departments of the Treasury Department to Mr. Littlefield when he was conducting an investigation into the expenditures of the Department last year; in fact, the Treasury official even went further and said that the accounts of our Department were the best that were submitted to the Treasury. I do not wish to say that such is the case, but I will say that they are submitted in as good form as the accounts of any other Department.

The CHAIRMAN. Then, as I understand it, the check on you is the examination which is made of the accounts you pay by some official connected with each bureau from whose appropriation the money to pay that account is drawn?

Mr. ZAPPONE. Precisely, and that makes a most complete check. I wish to say, gentlemen, that during the last quarter one of the bureaus discovered a voucher that was paid from the wrong fiscal year. In the great mass of business passing through—about 80,000 accounts annually—a mistake will be made once in a while. I had paid it out of the 1907 appropriation instead of the 1908 appropriation. The chief of the bureau concerned approved my abstract of

disbursements in that case for that much less in 1907, and to the 1908 abstract he added that much more, reporting it in a letter to the Secretary. After I submit my accounts to the Secretary they pass out of my hands. In the case cited it became necessary to write a letter to the Secretary of the Treasury, signed by our secretary, asking for what we term a transfer warrant, transferring the amount from one appropriation to another. It shows what an excellent check system we really have, and to a large extent it is due to the orders and circulars that have been issued by the Treasury Department during the past year and a half, during which time many improvements have been made in the methods, and I must say that some of those improvements are of great benefit.

For instance, the Treasury used to require receipts to all vouchers in advance. A man having an account against the Government was required to receipt for his money in advance and wait perhaps thirty days or two months for actual receipt of check. That is all done away with now. We no longer require a receipt to a voucher, but when a man submits an account he certifies that the amount is due, and that it has not been paid. He says, "I certify that the above amount is due, and that I have not been paid." I draw a check in payment of that account, and the Comptroller and the accounting officers of the Treasury hold the check as a receipt. The check goes to one of the subtreasuries and is afterwards sent to the Treasury, where the auditor for the State and other departments compares it with and attaches it to the account in payment of which it was actually drawn. That is one of the innovations, and it is an excellent one. If an account is received made out in the name of John Smith for \$100, and I should draw a check for \$200, and if it went through the Treasury, getting through all these safeguards I have mentioned, the Auditor would compare that check with the account, and he would see that John Smith claimed \$100, and a check had been issued for \$200, and there would be a disallowance against my account immediately and an explanation demanded.

Mr. COCKS. You do not require a receipted bill?

Mr. ZAPPONE. We do not require a receipted bill except when the amount is actually paid in cash; as, for example, the salaries here in the city of Washington. I pay these salaries in cash, and at the same time I take a receipt from each employee. We have a small form of printed receipt, upon which the actual time of service of the employee is entered, and this, unsigned, is turned over to him. A pay roll, which is only an abstract of payments, is also prepared. The employee holds the receipt in his possession until pay day. I pay off the Department by passing around through the different bureaus. In doing this I have the assistance of three others in my office. It takes four of us to pay the entire Department, and as we visit one bureau after another the employees form in line and present those slips to us, signed—or they sign them at the time at some convenient desk—and then we hand them the money. If an employee is not at the office on pay day, he leaves an order and an address to which he wishes his money sent, and then it can be paid only by check. In other words, if a person is not there to receive his salary in person the payment must be by check. That is another of the new safeguards. So, I think, so far as the administrative examination and safeguards are concerned, Mr. Chairman, the system

and methods of the Departments are better to-day than they have ever been before in the history of the Government.

Mr. POLLARD. In regard to this item for meat inspection, there is a permanent appropriation of \$3,000,000. The first two quarters the amount is \$800,000 for each quarter, and the last two quarters it is \$700,000 for each quarter. That is all for inspectors, I suppose?

Mr. ZAPPONE. The principal expenditures under meat inspection are for salaries of inspectors.

Mr. POLLARD. Then the last two quarters of the year they must cut down the inspectors?

Mr. ZAPPONE. Not necessarily. There were some incidental expenses. Office quarters have to be rented and other miscellaneous expenses incurred, making the expenses really greater in the first two quarters of the year than in the last two. Under the instructions of the Secretary you will find that the bureau chiefs must charge up all their liabilities immediately, except in the case of leases and agreements, which may be divided up into four quarters, if desired. That explains the larger allotments in the first two quarters and the smaller allotments in the last two quarters; that is the reason for the apparent discrepancy. The law does not say how much shall be allotted to each quarter, and naturally, as the Secretary does not wish to cripple the business of a bureau, there would be no good reason for holding back a portion of the amount in the first two quarters. It would simply occasion a delay in the work.

Then, again, it must be understood that in some of the bureaus, particularly the Plant Bureau and the Forest Service—in fact, I might say in most of the bureaus—the great bulk of the work is done during the early spring and summer months, and most of the traveling is done during that period.

Mr. POLLARD. During the first and last quarters?

Mr. ZAPPONE. During the first and last quarters.

The CHAIRMAN. Will you state for the information of the committee what other appropriation bills besides the one that is sent out of this committee carry money which is paid out through your office?

Mr. ZAPPONE. The permanent appropriation of \$3,000,000 for meat inspection is now carried under the head of permanent appropriations, in the back part of the Book of Estimates. It has to be reported each year to Congress, so that Congress may know how much will be necessary for permanent appropriations, as well as for current appropriations, that it is making from day to day. In addition to the appropriation for meat inspection there is an item of \$550,000 for printing and binding in the sundry civil bill. In regard to that I would like to repeat what I said at a meeting of our Department council yesterday, that I believed that if that amount were transferred to the appropriation bill of the Department with a proviso that competition be secured for all work for printing and binding we could make the amount go much further than it goes now, and probably do with a less amount. Doctor Arnold, from the Division of Publications is here, and will follow me shortly; I would like to have this suggestion submitted to him; I am merely repeating a recommendation that I made last evening.

The CHAIRMAN. Your idea is that if an opportunity were given, private printers might submit lower estimates for doing the work than the Public Printer can do?

Mr. ZAPPONE. I feel firmly convinced of that. I would like to say that under the law we are only required to have printing done at the Government Printing Office when it is needed for the Executive Departments here in Washington. That is the general statute. Our field printing is still paid for out of our lump funds, and is done by private printing firms in the field. Take, for instance, the printing of the Crop Reports and the Weather Bulletins of the Weather Bureau stations outside of Washington; that is all paid for out of the general fund. Within the last year and a half the Comptroller of the Treasury has decided that meat-inspection labels may be paid for by the Bureau of Animal Industry out of its permanent appropriation of \$3,000,000, as it is entirely for the field service, and that meat-inspection work is really field-service work. He has rendered a similar decision in regard to the Reclamation Service. In the case of the Bureau of Animal Industry he even went so far as to say, "You can secure competition right here in the city of Washington for these meat-inspection labels," and when that was done the Public Printer entered the lists and was one of the bidders; but there was a mistake made in his bid, and one of his men was sent over post haste to withdraw it. I think the bid was considered as placed a little too low, and in that particular case the bid was withdrawn. But the Public Printer is willing to bid on all such work, and does bid at times.

The CHAIRMAN. In this particular case was the printing awarded to the Public Printer or to a private firm?

Mr. ZAPPONE. To a private firm; the Public Printer withdrew his bid.

The CHAIRMAN. The Farmers' Bulletins are among the publications that are paid for out of permanent appropriations?

Mr. ZAPPONE. Out of the public printing appropriation; the appropriation of the printing office which is under the supervision of the Public Printer.

The CHAIRMAN. That is the bulk of the appropriation?

Mr. ZAPPONE. Yes, sir. The major part of the printing is paid for out of the general fund under control of the Public Printer, but we continue to pay small amounts from several of the lump funds for field service. Under the law, a year or two ago, all printing was eliminated from lump funds so as to prevent its being done except by the Public Printer; and now printing is only done in one or two bureaus for the field service.

The CHAIRMAN. Are there any other appropriations that are carried in other bills that are paid through your office?

Mr. ZAPPONE. None that are paid through my office except the special appropriations that have been made from time to time for the erection of the Department buildings. The last appropriation for that purpose, which was included in the sundry civil bill, was for \$250,000. That was appropriated for the current year, and made up the total amount of \$1,500,000. All of that money has been disbursed by me. The actual expenditure of it has been under the direction of a building committee, of which Doctor Galloway is the chairman.

The CHAIRMAN. Are there any sums carried in this bill that are not paid out through your office?

Mr. ZAPPONE. The sums appropriated for the Forest Service are not paid out through my office. As I stated, there is a special fiscal

agent there who pays out the amounts appropriated for the Forest Service, but all other amounts are paid through my office.

The CHAIRMAN. Including the item of \$720,000 for the agricultural experiment stations?

Mr. ZAPPONE. No; that is paid by the Treasury Department. I did not quite grasp your question, Mr. Chairman. The amount of \$720,000 for the agricultural experiment stations is paid out by the Treasury Department. The requisitions for that money are approved by the Secretary of Agriculture, but the actual disbursement of it is not under my supervision. The amounts are sent direct by the Treasury to the various agricultural experiment stations. That is also true of the appropriation under the Adams Act, which is a continuing appropriation and increases the amount for each agricultural experiment station \$2,000 annually, with the exception of our three insular stations in Alaska, Porto Rico, and Hawaii. The Comptroller has decided that these three insular stations do not come under the provisions of the Adams Act, and for that reason each year the chief of the Office of Experiment Stations recommends \$2,000 additional for each one of those stations, which seems a very proper thing to do, in order to place them on all fours with all other experiment stations.

The CHAIRMAN. How about the sums appropriated to carry into effect the Nelson amendment?

Mr. ZAPPONE. With relation to agricultural colleges?

The CHAIRMAN. Yes.

Mr. ZAPPONE. The amounts appropriated for the agricultural colleges are under the supervision of the Secretary of the Interior. Last year there was a provision added to our appropriation act—I think the last item in the act—appropriating \$5,000 additional as a sort of continuing appropriation, and the Treasury decided that as the first appropriation was placed under the control of the Interior Department, it would be necessary for that Department to also disburse that money. It amounted to \$240,000. So the warrant for it was subject to the control and supervision of the Secretary of the Interior. The idea was to bring the total amount for the agricultural colleges up to, I think, \$50,000, was it not?

The CHAIRMAN. Yes; that was the ultimate expectation of the bill. Do you know in what appropriation act the amount for the agricultural colleges is carried?

Mr. ZAPPONE. I have it right here I think that is the original Morrill Act. It is what they call the first Morrill Act, of 1862.

The CHAIRMAN. Yes.

Mr. ZAPPONE. The act of 1866 extended the time in which agricultural colleges might be established, and then the act of 1887, establishing agricultural experiment stations, followed. That was the Hatch Act.

The CHAIRMAN. Yes.

Mr. ZAPPONE. In 1890 we had the second Morrill Act for the further endowment of agricultural colleges.

The CHAIRMAN. I was only inquiring as to what appropriation act carried the annual appropriation for those acts.

Mr. ZAPPONE. It was a special act, an act donating public lands to the several States and Territories which may provide colleges for the benefit of agriculture and mechanic arts.

The CHAIRMAN. I do not think you quite understand. You know the original Morrill Act set apart certain public lands in the several States for the use of these land-grant colleges, as they were called.

Mr. ZAPPONE. Yes.

The CHAIRMAN. And that was followed by legislation appropriating a fixed sum of \$25,000 annually to each of these colleges in lieu of the amount they might have received from the original act, and I was simply inquiring which one of the appropriation bills it was that provided that fund annually.

Mr. ZAPPONE. The Department of the Interior is in the legislative act, and I am quite sure, Mr. Chairman, it was in that act.

The CHAIRMAN. I presume that is where it comes.

Mr. ZAPPONE. I can not speak with positiveness offhand, but that is my impression.

Mr. POLLARD. Why is it that in your office you can get the Government printing done by private printers cheaper than the Public Printer can do it? It seems to me that is a condition that ought to be looked into. As I understand it, the Government furnishes all of the typesetting machines and everything that the Public Printer has to work with, and all they have to pay is the wages. They pay the men who operate the printing shop and they pay the cost of the material that they use, and these Government publications are supposed to be printed at cost. These men are not supposed to make any profit at all, as I understand. It looks as though it ought to cost the Government less, when that work is actually being done at cost and at the Government's own plant, than it would be possible to get it done for by a private concern. I would like to have you explain the reasons for your theory that it can be done cheaper if a private printer is given an opportunity to bid on it.

Mr. ZAPPONE. It seems to be a matter of common knowledge among the officials of our Department, and I might say among the officials of some of the other Departments. I think it is due largely to the fact of the cost of maintenance and the salaries. I think the Government pays better salaries to its printing-office force than are paid by private firms and corporate bodies outside, and I think the Government should pay more. Especially is this true of the messenger and watch forces and a great many more of them.

Mr. LAMB. Then do they not work shorter hours in the Government?

Mr. ZAPPONE. Yes; in some cases the hours are shorter; however, I think the unions practically fix the hours of labor.

The CHAIRMAN. So far as the expert work is concerned in the Government Printing Office the salaries are in no case higher, and in some cases lower than in private employment of the same class, and they work the same number of hours. For example, the Mergenthaler linotype operators are paid less in the Government office than they are in many of the newspaper offices over the country. All of which makes it still more strange that the Government should not be able to do the work as cheaply as private parties, which only illustrates the fact that the Government can not do anything as cheap as private enterprise can.

Mr. LAMB. I do not believe it can.

Mr. ZAPPONE. The standard is higher. This is also true in the matter of clerical help. The ordinary stenographer and typewriter

that would be satisfactory for an average firm or corporation outside would not be satisfactory at all for the Government service. The letters that would be written by them would not be sent out by the Departments. I do not mean that as a disparagement at all, and I also wish to qualify my remark about the printing. I did not mean that as a criticism, but I do think that if we could have the printing done by private parties we could have it done more cheaply and satisfactorily. I wish it distinctly understood that this is no criticism of the Government Printing Office, or of the manner in which the printing is being done there.

The CHAIRMAN. We have been very much interested and are very much obliged to Mr. Zappone for the information he has given us. Mr. Arnold is here, in the absence of Mr. Hill, the chief of the Division of Publications, who I regret to say is ill and unable to be present, and I think we will ask Mr. Arnold first to notice the changes that are submitted in the estimates for his division, and give us some reason why the increases which he recommends ought to be made.

**STATEMENT OF MR. JOSEPH A. ARNOLD, ASSISTANT EDITOR,
DIVISION OF PUBLICATIONS, DEPARTMENT OF AGRICULTURE.**

The CHAIRMAN. I notice, first, that you ask an increase of \$250 in the salary of your editor, or assistant chief.

Mr. ARNOLD. That, Mr. Chairman, is an increase in my own salary. Naturally, I have some delicacy about referring to the necessity of it.

The CHAIRMAN. We will not ask you.

Mr. ARNOLD. I would be perfectly content to leave that to the decision of the Secretary, who has made it without my knowledge and without my request, and I think he is perhaps the better judge of the justice and the necessity of it.

The CHAIRMAN. Will you let me inquire in that connection how long you have been acting as chief of the division?

Mr. ARNOLD. I have been in immediate charge, with the exception of about ten days, since October 22, 1907. Prior to that time, always during the absence of the chief, I have performed the duties of acting chief. I have been connected with the division since July 8, 1891, now nearly eighteen years, and for fifteen years of that time I have been the assistant chief and the acting chief in the absence of the chief.

The CHAIRMAN. How long has your salary been at the present figure?

Mr. ARNOLD. This is the fourth year. In the matter of my own salary, I am perfectly willing to leave that to you gentlemen.

The CHAIRMAN. How long has the associate editor been receiving his present salary?

Mr. ARNOLD. The associate editor has been receiving \$2,000 for three years, in addition to the present fiscal year. He is the gentleman who has immediate supervision and charge of the editorial section, as we call it, in which are employed six editors and one typewriter and one messenger. He is a first-class man in every respect, and by comparison with the amount paid for such work by outside firms I think his salary at \$2,000 is small. I think an increase of \$250 would be an act of justice in his case. He is one of the best men, if

not the very best man, we have in the division, performing the highest grade of work.

The CHAIRMAN. Just how much responsibility has he?

Mr. ARNOLD. I can answer that better by explaining, probably, the method of our work. The Secretary of Agriculture is, in reality, ex officio the editor of the Department. We are his assistants. To our division are submitted all the manuscripts prepared in the various bureaus, divisions, and offices, intended for publication. These manuscripts are carefully examined, edited, and a report made to the Secretary showing the nature of the bulletin, the number of copies proposed to be issued, together with any recommendations or suggestions for improvement that we may have to make. If the Secretary cares to see the report or the manuscript it is shown to him, and if he agrees that our recommendations are timely and well made, we take the manuscript back and proceed to make the changes. It may be that in conference with him certain radical changes are found necessary, which he instructs us to make. Then we take the manuscript back and after working it out along the lines that have been agreed to by the Secretary, the manuscript is returned to the bureau from which it came for criticism. It then comes back to us for publication.

This associate editor is the principal factor in adjusting differences, if any occur, between our editors and the division submitting the manuscript. Very careful work is required and, due largely to his efficiency, I may say, we have very little friction with the various bureaus, divisions, and offices.

The CHAIRMAN. There has been no increase in his work either in quantity or in the character of it, I presume?

Mr. ARNOLD. A slight increase, owing to the natural increase of the publication work of the Department.

The CHAIRMAN. I had just asked you if there was any increase in the amount of work or responsibility placed upon this associate editor.

Mr. ARNOLD. None other than the natural increase due to an increase of the work.

The CHAIRMAN. And is the same true in regard to the change in your system of indexing, for which an increase of \$200 was submitted?

Mr. ARNOLD. Let me explain that the section on indexing is a force distinct from the editorial section, and it is in charge of this assistant to whom it is proposed to give \$200 additional. He has a force of six people in his charge, and the work of that section consists in the making of indexes to the publications as they are issued and the preparation of a card index of all the publications of the Department, which makes the contents of the publications available for reference and use, and in this division the miscellaneous correspondence is conducted, so that the general index is necessary in order to permit of the intelligent answering of letters upon miscellaneous subjects.

The CHAIRMAN. Do you know how long he has been receiving his present salary?

Mr. ARNOLD. I think four years.

The CHAIRMAN. His duties are no more arduous now than they have been, are they?

Mr. ARNOLD. I think they are, possibly, because of the increased work of indexing; more and more the publications are being indexed, and it is being extended to bulletins and reports which did not heretofore have an index.

The CHAIRMAN. You seem to have provided for that extra work by submitting an estimate for one index clerk.

Mr. ARNOLD. I think the additional index clerk is also required. Let me add in regard to this \$200 increase; first, that it was thought no more than fair that we should put him on an equality with the assistant in charge of the document room, and also the assistant in charge of the illustration work, both of whom are at present receiving \$2,000. The indexing section, as you will see by the chart there, is one of the regular sections of the office, and by this change it would put them all practically at the same rate.

Mr. LAMB. Who is the assistant in charge of the document room?

Mr. ARNOLD. Mr. Handy.

The CHAIRMAN. Do you wish us to understand that there is as much responsibility on the shoulders of your assistant in charge of indexing as there is on the hands of the man in charge of the document room?

Mr. ARNOLD. I hardly think so, sir. I do not think there is as much responsibility upon his shoulders as there is on those of the man in charge of the document room, who has under his charge about 140 people, the management of whom without friction requires tact and ability. It should be remembered, however, that indexing is expert work.

The CHAIRMAN. Let us hear what you have to say on the necessity of an additional index clerk. Has the work increased to such an extent that another man is needed?

Mr. ARNOLD. I think I can say that it has increased to that extent; furthermore, it is proposed to carry the indexing work back further than we have been able to do with the present force. In the earlier years of the Department not all of the publications were indexed, and about all we know of them is the title of the publication, and it is proposed now to take those up and make a careful index of each one, so as to be able to answer any inquiries at any time in regard to the contents of the earlier publications.

The CHAIRMAN. The later publications are all indexed, are they?

Mr. ARNOLD. Nearly all of them of any size.

The CHAIRMAN. As a matter of fact are not the earlier publications out of date, and in the nature of things would it not be so?

Mr. ARNOLD. I think it is largely so.

The CHAIRMAN. And therefore would it not be largely a waste of time and money to have them indexed?

Mr. ARNOLD. I do not think so. There is a constant demand for the old publications of the Department by individuals who want them often to complete sets or compilations they are getting up, and we ought ourselves always to know just what the Department has published.

The CHAIRMAN. You spoke of the assistant in charge of indexing having 6 people under him. I presume they are clerks of the various classes?

Mr. ARNOLD. They are clerks of the various classes. One or two of them are capable of and are doing indexing, although they are not

experts. That was one reason why we thought we could make better progress if we had an additional clerk who was an expert in that line of work.

The CHAIRMAN. You ask for an increase of \$200 in the salary of each of the four assistant editors. I presume that is simply for the sake of giving them promotion. It is not because there is any particular addition to their work or responsibility?

Mr. ARNOLD. No particular addition to their work; no, sir. I do think, though, that those gentlemen are doing a grade of work which entitles them to receive the amount we ask for here—\$1,800. They are very efficient and faithful.

The CHAIRMAN. Do you know how long they have been serving at \$1,600?

Mr. ARNOLD. They have been in the service of the Department various lengths of time. One of them has been in the service of the Department seventeen years, another five years, two others three years.

The CHAIRMAN. But you do not know how long they have been receiving their present salary?

Mr. ARNOLD. Various periods, ranging from one to five years.

The CHAIRMAN. You submit an increase of one editorial clerk.

Mr. ARNOLD. That is to provide for the growth of the work. We have more now—almost more—than we are able to take care of with the present force. The publication work is increasing from year to year, and this is simply a provision for future needs of the Department for work of that kind.

The CHAIRMAN. Can you give us an idea of the extent to which the publication work has grown this year over last year?

Mr. ARNOLD. I think there were about—my recollection is—244 more publications during the last year than there were in the preceding one. I might add here that the total number of publications issued during the last year—

The CHAIRMAN. That is the last fiscal year ending June 30, 1907?

Mr. ARNOLD. During the last fiscal year the total number was 1,415, of which 521 were new, and 819 were reprints, the total editions of all the publications aggregating 16,646,910 copies.

Mr. POLLARD. If the committee or Congress should give you these additional clerks, the additional index clerks, and your own extra editorial clerk, could you keep up with the work of your bureau so that the bulletins and other publications would come out promptly, without having to wait so much?

Mr. ARNOLD. I think that would provide against the necessity for any increase for several years.

Mr. POLLARD. That does not answer my question. My question was, whether, if these additional clerks are given you, you could keep up with the work and not have it necessary to wait six weeks or two or three or four months before the publication is printed after it leaves the hands of the compiler.

Mr. ARNOLD. I do not know that that length of time due to insufficiency of our force very often elapses. I am not aware of any case where it has elapsed. Certainly it is never our intention to allow anything like that length of time to elapse. Various causes may contribute to the delay for which this office would not be responsible.

Mr. POLLARD. I think that a gentleman who came before the committee told me here that a certain publication had been in the hands of the Public Printer for three or four months. I think he said in some instances it was six months before a publication came out. I do not recall the name of the individual.

Mr. ARNOLD. There may have been some extenuating circumstances with which you were not made acquainted.

The CHAIRMAN. I remember this instance, the annual report of the chief of the Bureau of Plant Industry, the manuscript of which left his hands, he told us, early in November, left the hands of the Public Printer on the 7th day of January, about six weeks after it was completed by the author. Was that delay in your office?

Mr. ARNOLD. No; it was the result of a decision not to send those reports to the printer until after the publication of the Secretary's report.

Mr. POLLARD. The Secretary's annual report?

Mr. ARNOLD. Yes; the Secretary's annual report.

The CHAIRMAN. The Secretary's annual report was ready when?

Mr. ARNOLD. That came out along about the 1st of December.

The CHAIRMAN. Then it must have been delayed five weeks after that.

Mr. ARNOLD. There was no delay in our office in getting it through the usual channels through which a report would have to go. I can not say offhand. Possibly the Secretary may have asked to see it; there was some delay by the printer.

The CHAIRMAN. I understand, then, answering Mr. Pollard's question, that you would say that with your present force publications are not unduly delayed?

Mr. ARNOLD. I pride myself, as acting head of the division, that there is no unusual delay.

Mr. POLLARD. For some unknown reason most of the reports of the different chiefs of the bureaus did not reach this committee until after the chiefs appeared here and were heard, and in almost every instance the chief said that his report had been in the hands of the printer all the way from two to six weeks, and we could not understand why it had not come before us. I do not know who was responsible for it, but certainly somebody was.

Mr. ARNOLD. Yes. It is possible, though, that some of the reports had been completed and the chiefs were not aware of the fact. I think that is true as regards two or three of them.

Mr. POLLARD. Do you have any recollection of the case of the Bureau of Plant Industry?

Mr. ARNOLD. No, I can not remember that, but I will furnish you with the data from our records. The copy for the report of the Chief of the Bureau of Plant Industry for 1907 was submitted to the division of publications November 29, 1907, and sent to the Government Printing Office December 6. The galley proof was received from the Government Printing Office December 14 and sent on that day to the Bureau of Plant Industry. The bureau returned the galley proof to the division of publications on the evening of January 3, and the same was sent to the Government Printing Office January 6. The page proof was received from the Government Printing Office January 16, and sent on that day to the Bureau of Plant Industry, from which it was received on the evening of the 17th, and sent to the Government

Printing Office for printing on January 18. Printed copies of this report were received January 22, 1908.

The CHAIRMAN. I notice you submit a change in the title here from one draftsman or clerk to one draftsman or photographer, and the same in the line below, two draftsmen or photographers, instead of two draftsmen or clerks, as the title formerly read. What is the reason for that?

Mr. ARNOLD. That is so as to make them interchangeable. Under the present designation a photographer can not be appointed to the position. In the case of a vacancy it may happen that we might have greater need of a photographer than a draftsman. If the proposed change is made we can fill the place with the one most needed at the time the vacancy occurs.

The CHAIRMAN. You submit estimates for two additional draftsmen or photographers. Why are they necessary?

Mr. ARNOLD. That will give me an opportunity to talk a little, with your permission, about the photographic work. By direction of the Secretary the photographic work is now being centralized in the division of publications, and being discontinued in all the other bureaus, divisions, and offices, and I do not think that the increase we ask would in reality be an increase, because it is so much less for the other bureaus, divisions, and offices, to perform. There is a very large amount of photographic work done for several of the divisions, notably the Bureau of Plant Industry, especially during the growing season, for the Office of Experiment Stations, and also for the bureau of entomology; in fact, for all the bureaus. Those photographs that are taken in the field are brought back to the Department, developed, and filed away as permanent records of the investigation work of the various bureaus conducting the work. There is just at this time a very considerable accumulation of photographic work which we are not able to keep abreast of. In fact, I think in this line of work we are two months behind, with but little prospect of catching up, and I wish you would look upon it as in reality not an increase in money, because the other bureaus which have discontinued it have asked for so much less money, because they are not doing the work any longer.

The CHAIRMAN. Do you remember what bureaus have discontinued the work that were formerly doing it?

Mr. ARNOLD. The Bureau of Plant Industry, in particular.

The CHAIRMAN. The Bureau of Plant Industry this year estimates for 3 photographers and 1 artist.

Mr. ARNOLD. I do not know what they are doing, but I do know that perhaps the bulk of our work in photography is at this time for the Bureau of Plant Industry.

The CHAIRMAN. They have not estimated for any decrease in their force of photographers and artists.

Mr. ARNOLD. I do not know what work is being done by their men. I only know that we are doing all we can to help them in photographic work.

Mr. POLLARD. You are asking for these additional men in order to enable you to keep up with your work?

Mr. ARNOLD. In order to keep up with the work. There is a tremendous amount of photographic work which we are at present unable to handle.

There is one item that I would like to invite your attention to, and that is "one chief folder, one thousand dollars." I want to recommend to you an alteration in that so that it shall read "one clerk, now chief folder," for, as a matter of fact, the person filling that position is not a folder at all, but a clerk.

Mr. POLLARD. You mean the chief folder, the third item from the bottom of page 36 of the estimates?

Mr. ARNOLD. Yes. It is a misnomer. Some years ago that office was filled by a man, and he was a folder who put up documents. Now the position is filled by a woman, and I think with this alteration it would be all right.

Mr. POLLARD. What are her duties.

Mr. ARNOLD. She is a bookkeeper. She keeps account of the distribution of the Farmers' Bulletins at this time.

Mr. POLLARD. Would it be sufficient to put "one clerk?"

Mr. ARNOLD. I consulted the appointment clerk of the Department in regard to this, and in order not to legislate the person out of office, he suggested the alteration I have stated, "one clerk, now chief folder." The same is true of the item following, "one folder." I want to suggest to you an alteration of that to "one clerk, now folder," because the people filling the positions are not folders any longer.

The next addition, I think, Mr. Chairman, is 13 skilled laborers at \$660 each.

The CHAIRMAN. Yes.

Mr. ARNOLD. I want to suggest to you the desirability of making that 10 skilled laborers at \$840.

The CHAIRMAN. How does it happen that you ask for 13 additional skilled laborers?

Mr. ARNOLD. We need the laborers to assist in the mailing of the documents, which are being received in such large numbers that with the force at hand we are not able to make prompt distribution of them. I do not mind saying to you gentlemen here that we do keep abreast of the Congressional distribution, that is done very promptly, but in regard to the distribution to miscellaneous applicants, we are away behind and unable to keep up with it. We want men here, too, to assist in the hard work, that is, putting up and mailing.

The CHAIRMAN. And you think 10 skilled laborers at \$840 each would give you better results than 13 at \$600?

Mr. ARNOLD. I do. That would give us a chance to promote some who are already in at \$600 and \$720, which I think would be an encouragement, and this is allowing for 10 new skilled laborers to come in at \$600.

The CHAIRMAN. An addition of 10 at one fell swoop is quite a jump.

Mr. ARNOLD. Yes, sir; but the estimates call for 13 at \$660, but I believe that 10 at \$840 would save some money and get better results. I want to insist on the necessity of this additional help, because I think you would perhaps be satisfied from a visit to our document room that we are decidedly short on skilled laborers to do the actual work of mailing. We are running behind, and we can not get the documents out as fast as we should. I say that may not be apparent to you gentlemen, because we aim to give you gentlemen preferential treatment, but we can not extend that same preference to miscellaneous applicants without this additional force.

Mr. LAMB. What proportion do the miscellaneous applicants bear to the Congressional?

Mr. ARNOLD. It is larger than the Congressional, probably much larger.

Mr. LAMB. Are they private individuals?

Mr. ARNOLD. Private individuals; yes, sir.

Mr. LAMB. I thought you did not send them except to the Congressmen in each district.

Mr. ARNOLD. A great many applications come to us direct, not through the Congressmen, for farmers' bulletins and for circulars which are for free distribution.

The CHAIRMAN. In your lump sum there is a paragraph providing for additional assistants. How many assistants are employed out of your lump-sum roll, simply those who are scheduled on the following page, 38?

Mr. ARNOLD. I think we are paying out of that sum now \$13,000, but I think that the reason those people are on that roll is that, by some mistake, when the very large number of our people were transferred from the lump roll to the statutory roll, these were overlooked.

The CHAIRMAN. These are employed regularly?

Mr. ARNOLD. Yes, sir.

The CHAIRMAN. And they are in the classified service?

Mr. ARNOLD. Yes, sir. I confess to you I see no reason why they should not have gone on, and I think it was due to an error that they were not put on at the time.

The CHAIRMAN. If we were to allow you the increase on the statutory roll, how many of these people could you probably eliminate?

Mr. ARNOLD. How many could we eliminate?

The CHAIRMAN. Yes.

Mr. ARNOLD. None whatever, because most of those people, are now working at mailing publication and some are photographers.

Mr. POLLARD. What goes in this lump sum of \$40,000?

Mr. ARNOLD. Material and supplies, rent, etc., besides the \$13,000 for labor is paid for from the lump sum, and I want to suggest to you in regard to this lump sum another point, and that is the necessity and advisability of including a certain amount for the preparation of farmers' bulletins. There is this year no fund for the preparation of farmers' bulletins. Last year there was an item for the preparation and printing of farmers' bulletins, but upon the recommendation of the Committee on Printing the item was taken out of our part of the bill and included in the printing bill, and in so doing the preparation was omitted, and we have now, therefore, nothing for the preparation of the farmers' bulletins.

Mr. POLLARD. What does this preparation include?

Mr. ARNOLD. That preparation includes the employment of any man who is competent to write a farmers' bulletin.

Mr. POLLARD. They are written by the different bureaus, are they not?

Mr. ARNOLD. Very largely; but I think the time has come when it is desirable often to go out of the Department to engage some one eminent authority to prepare bulletins on subjects concerning which no one in the Department is prepared to write or has time to write. We have issued, as you gentlemen know, 317 Farmers' Bulletins, covering practically as many subjects, and I do not see that we are at the

end of the road; but the Farmers' Bulletins are not as easy to procure as they were at one time, and there are several subjects—I do not know that I could mention them—concerning which our people do not feel that they are prepared to write, and yet there are many men throughout the country, specialists and eminent in their lines of work, whose services we could procure, and I think should be allowed to procure, to write us some Farmers' Bulletins. Sometimes a man in a section of the country—a man on the ground—might give us a better Farmers' Bulletin than a man from the Department going out there, a man who has never been there.

The CHAIRMAN. Is it not the theory of the Department that nothing shall be published as coming from the Department except the result of the work of some man or men in the Department?

Mr. ARNOLD. I presume that is the theory, but we have had several bulletins prepared by people outside of the Department.

Mr. POLLARD. Do I understand that this increase of \$5,000 you ask for is to be used for that purpose?

Mr. ARNOLD. No, sir; that is another point I am bringing to your attention. I should like to urge upon you the necessity of giving us \$5,000 to be used for the preparation of Farmers' Bulletins. You gentlemen want more, and you want some on subjects that have not yet been treated, and I am trying to suggest a way to get them for you.

The CHAIRMAN. That is a matter of policy we will have to discuss with the Secretary when he is before us.

Mr. ARNOLD. Yes, sir. This \$5,000 increase was simply designed to pay for the increased expenses in the mailing of publications.

Mr. POLLARD. That is for labor, is it not?

Mr. ARNOLD. It can be used for any one of the items enumerated in this paragraph. It can be used for illustration work; it can be used for rent; it can be used for a dozen other different items there.

Mr. LAMB. The way you have put it here is "to meet the increased demands and provide for the steady and legitimate growth of the Department."

Mr. ARNOLD. Yes, sir. Then I want to make another suggestion, Mr. Chairman, for \$5,000 or more for extending the system of addressing machine work in the document section.

Mr. POLLARD. Have you taken these matters up with the Secretary?

Mr. ARNOLD. Not all of these. With your permission, I would like to give you a little statement with regard to this request I am making of you now for \$5,000 for increasing the mailing facilities. Several years ago the document section investigated the subject of addressing machines and purchased a small outfit of the Elliot Addressing Machine Company, which plant has from time to time been increased until there are at present 118,000 stencils and the necessary cabinets and trays, 2 foot presses and 2 foot-power stencil cutters. The system has been found to be satisfactory, particularly because the addresses are always in the possession of this office and changes and additions, of which there are a number each month, can be made by the force employed in the document section.

In addition to this 118,000 addresses, which are handled on the machine, this office is called on to write 132,000 addresses for the mailing of the monthly list and about 100,000 for the mailing of the Crop Reporter, the preparation of which costs the office over \$3.25

per thousand and occupies the time of 25 clerks whose services could be employed to much better advantage were the office relieved from the necessity of writing these addresses.

The CHAIRMAN. How many operators would it require to use this system if it were employed?

Mr. ARNOLD. Five; we estimate 5.

The CHAIRMAN. Five would operate the entire mailing list?

Mr. ARNOLD. Would operate the entire mailing list; yes, sir.

The CHAIRMAN. How many people have you now?

Mr. ARNOLD. We have 25 doing nothing but writing franks.

The CHAIRMAN. And how many are operating machines?

Mr. ARNOLD. Two, regularly.

The CHAIRMAN. So that by an investment of about \$5,000, which you estimate as what it would cost to complete your mailing list with these stencils, you could eliminate about 23 persons who are now engaged in writing the addresses by hand?

Mr. ARNOLD. Yes, sir; a very slow and tedious process, as you know, of course.

Mr. POLLARD. What do these 25 clerks get now, who do this work?

Mr. ARNOLD. They get from \$600 to \$720. Five employees would be sufficient to handle the stencils and keep the lists in order, thus permitting the employment of 20 additional persons now engaged in preparing these lists at other duties.

The CHAIRMAN. If we put this system in, will you agree to eliminate the people whose places are taken by it?

Mr. ARNOLD. No; we do not want to eliminate them. We want to use them at other work now pressing on the document section. No; we need their services to keep the work up to date. I want you to feel that many of these people are really working for you, gentlemen, because it is a fact that they are, when you take into account the enormous distribution of publications that we are obliged to make, and largely upon your request. They are put in there to help along and get your publications out promptly, and get them out for everybody who asks for them, promptly.

Mr. POLLARD. If there will be no extra work above what you have now, and if we supply a machine that will do this work, and 5 men will do the work of 28, I do not see what you would have those 23 do? I should think they would be in the way there and would be falling over one another.

Mr. ARNOLD. I think we have in the document section now about 1,500,000 circulars for us to distribute for the Forest Service, which we have been up to the present time unable to touch because of insufficient force and have not been able to get at for some time, and there is a constant increase in the number and editions of the smaller publications.

The CHAIRMAN. Do you know how long it would take to install this mailing system?

Mr. ARNOLD. As quick as we could get the machines. It would be done in three months.

The CHAIRMAN. Three months?

Mr. ARNOLD. It could be done in less time than that.

The CHAIRMAN. That undoubtedly would relieve 20 people who could be put at other work?

Mr. ARNOLD. Yes, sir.

The CHAIRMAN. With that in view, do you still think you ought to have 10 additional skilled laborers?

Mr. ARNOLD. Oh, yes; because the people who are doing this writing are women, and what we particularly want now are those 10 men to do the heavy work.

The CHAIRMAN. Well, but is it not true that your recommendation for 10 additional men was made with the expectation that the women now engaged in writing these addresses would still be employed for that purpose; and therefore if we make that work unnecessary, does it not follow that either you will have more people than you can profitably use, or if we do not install the system you will not have enough men?

Mr. ARNOLD. Well, we have so much work there that I am not at all alarmed about having too many people to do it. The trouble is we have always more work than the force can handle.

The CHAIRMAN. I notice an item here for the pay of artists, draftsmen, and photographers. Do you employ such people sometimes temporarily who do not go on the permanent roll?

Mr. ARNOLD. We have not done that for two or three years. We used occasionally to go out and employ people to make, for instance, a half a dozen drawings at a certain price, but all of our photographic materials, you will notice, are provided for in this paragraph, so that this increase of \$5,000, some of it, is for the purchase of photographic material.

The CHAIRMAN. You have another item for purchase of manuscripts for publication. Can you give us any idea how much money you spend in that way?

Mr. ARNOLD. Last year I do not think we spent a penny.

The CHAIRMAN. That is only put in there so that if there is any manuscript submitted from some one outside of the Department which the Secretary thinks necessary it can be purchased?

Mr. ARNOLD. Yes, sir; that is it. It is for the Yearbook principally. It was not used last year, nor the year before, and it is simply to be used in case of emergency.

The CHAIRMAN. You have here a provision "for rent of buildings for the storage and distribution of publications; for the pay of watchmen and charwomen."

Mr. ARNOLD. Yes.

The CHAIRMAN. "For all necessary office fixtures and supplies."

Mr. ARNOLD. Yes.

The CHAIRMAN. You do not expect to have quarters in the new building, then?

Mr. ARNOLD. I think not, not even when the administration building is completed. We are now paying \$5,000 a year rent for that building, No. 215 Thirteenth street SW., and for storage, and so far as I know I am quite certain no provision has been made in the new building for that section of our work.

The CHAIRMAN. Recurring to the suggestion in regard to this mailing system, have you estimates from the firm on which you base the suggestion that \$5,000 will be necessary?

Mr. ARNOLD. Yes, sir.

The CHAIRMAN. Is it just that round sum?

Mr. ARNOLD. No, sir; it is in reality more than that. The exact amount is \$6,462. The cost of cutting the stencils will be \$5,000,

the cost of cabinets and trays will be \$1,062, and the automatic press will be \$400, making a total of \$6,462 to establish the plant; but I estimate that with the facilities we have between now and the 1st of July we might possibly cut quite a number of stencils—several thousand—so that I think for the present year \$5,000 will be sufficient.

The CHAIRMAN. Do you know how much the plant you now have there has cost you?

Mr. ARNOLD. We have spent, I think, in the neighborhood of \$1,800 on it so far.

The CHAIRMAN. Did you not tell me that the plant took care of 118,000 names?

Mr. ARNOLD. I think it does; yes, sir.

The CHAIRMAN. Then why should a plant to take care of 232,000 names cost \$5,000?

Mr. ARNOLD. Many of the stencils we now have were cut in the office by the regular force and the extra appropriation is for the installation of a power machine, the cutting of 250,000 stencils, and the purchase of cabinets and frames for storage. It is proposed to put in a machine which will run by electric power, so that we can run off these lists, instead of 8,000 a day, at the rate of 36,000 a day on each one of them.

The CHAIRMAN. Is there any competition in regard to furnishing this plant?

Mr. ARNOLD. There is no competition in regard to it, I think. It is a patented machine, and of course while it is for sale by different people, I understand the price is uniformly the same.

The CHAIRMAN. Have you compared the estimate given to you there with the published prices of this firm?

Mr. ARNOLD. No, sir; I have not.

Mr. POLLARD. Are you familiar with the machine, so that you know it will do the work after you get it?

Mr. ARNOLD. I think it will; yes, sir.

Mr. POLLARD. Have you one now?

Mr. ARNOLD. We have two, as a matter of fact, now, which are run by foot power, which is of course very laborious and very slow. It is proposed now to attach a power plant, which will greatly increase the speed and save the services of one man. It seems to be a very good system on the whole, and it seems to me a pity now to throw away \$1,800, which we have already spent, to equip ourselves along this line of work simply to adopt some other system.

Mr. POLLARD. How did it come that this recommendation was not made by the Secretary; that he did not indorse it. Was it called to his attention?

Mr. ARNOLD. I do not think it was brought to his attention. I must confess to you, of course, that I had nothing, or very little, to do with the making of these estimates originally. They were made by Mr. Hill when he was still at the Department. I believed it, however, my duty to bring it to your attention.

The CHAIRMAN. Is there any other member of the committee who has any further questions to ask Mr. Arnold? Mr. Arnold, have you anything further to say?

Mr. ARNOLD. I want you gentlemen to be as liberal with us as possible on this lump sum, because there are so many things included

there. Our photographic materials are all there, and without this increased sum it is going to be very difficult to do this increased work of photography.

The CHAIRMAN. We will carefully consider everything that you have said.

Mr. ARNOLD. I want to say that there are a good many more people who should be promoted than are provided for in this statement. There are lots of deserving people that are earning more money than they are now receiving and there are a good many who are receiving \$600, \$720, and \$840 who should be promoted to \$900. I understand that the Secretary is going to ask, eventually, if it is not provided for in some other way, that you increase the pay of the 68 clerks now receiving \$600, \$720, and \$840 to \$900.

The CHAIRMAN. We will hear him on that subject before the hearings on the bill are closed. Have you anything further?

Mr. ARNOLD.. Nothing further except this: I think you have said nothing about the increase of \$200 asked for the chief clerk of this division. I hope you will grant this just recognition of the varied and valuable services of this employee, who has been in the employ of the Department for eleven years and at his present salary for four years.

The CHAIRMAN. We are very much obliged for your appearance here.

Mr. ARNOLD. Thank you, Mr. Chairman.

(At 4 o'clock p. m. the committee adjourned until to-morrow, Wednesday, February 5, 1908, at 10 o'clock a. m.)

WASHINGTON, D. C., *February 5, 1908.*

The committee met this day at 10.15 o'clock a. m., Hon. Charles F. Scott, chairman, presiding.

The CHAIRMAN. We have reached the Bureau of Statistics, gentlemen, in our consideration of the estimates, and in the absence of the chief of that bureau, Mr. Victor H. Olmsted, I have asked the acting chief, Mr. Clark, to come before the committee. I think, perhaps, in view of the fact that there are a number of gentlemen on the committee who have not been here before, it may be well, Mr. Clark, if you would rapidly give an outline of the work which your bureau does and of the manner in which it does it.

STATEMENT OF MR. CHARLES C. CLARK, ASSOCIATE STATISTICIAN AND ACTING CHIEF, BUREAU OF STATISTICS.

Mr. CLARK. Mr. Chairman and gentlemen of the committee, the Bureau of Statistics is charged with the collection of agricultural statistics, the results of which are published each month in the Government crop reports in regard to cotton and the different grains and live stock.

Briefly stated, an outline of the bureau's plan of work is to gather each month similar information from several different classes of correspondents and agencies distributed throughout the country; to have those reports transmitted to the Department at Washington, where, under strict orders and regulations, they are compiled and

digested; and, finally, from such data, reports are prepared and published at a stated day each month. Schedules are prepared each month and printed at the Government Printing Office, the questions differing each month as the crop progresses, the inquiry in the early spring being as to the acreage compared with that of the year previous, the growing season being reflected in the condition reports of the growing crops, and in the fall, or at harvest time, the yield per acre is ascertained, which, being applied to the acreage, gives the production or quantitative figures for the year. These schedules are sent to the different classes of correspondents in franked envelopes, and returned each month in time for tabulation.

The Bureau of Statistics obtains the information upon which the estimates are made from seven different and distinct sources, as follows: Special field agents, State statistical agents, county correspondents, township correspondents, individual farmers, ginner, special cotton correspondents.

(1) *As to the special field agents.*—The country is divided into sixteen sections, and to each of these sections is assigned a special traveling agent, whose duty is to travel about, covering his territory thoroughly each month, seeking information from his own observation in the fields, by consulting with correspondents, and keeping in touch with best informed opinion, and local sources. These men are paid salaries and expenses, and devote their entire time to the work of the Bureau. I have prepared a large map of the United States [exhibiting], and the black disks show the location of the official stations of each of these special field agents, and the tape marks the boundary lines of the territories covered by each agent.

As stated, the special field agents or traveling agents are assigned to certain sections of the country, which has been divided off by States, and their duty is to travel continuously throughout their districts or the territories assigned to them and gather all the information required to answer the inquiry for that month, and to transmit their reports to Washington by a code telegram at a date preceding the issuance of the report, and to send further notes and remarks bearing upon abnormal weather conditions that may exist in their territory.

(2) *State statistical agents.*—Men of standing and repute are selected for each of the States and are paid salaries for such time as they are required to devote each month to crop-reporting work. Each of these agents has a list of correspondents located in different parts of his State, entirely independent of those reporting directly to the Department at Washington. These correspondents report each month directly to the State agents on schedules furnished them [exhibiting the same]. These reports are then tabulated and weighted according to the relative product or area in each county, and are summarized and analyzed by the State statistical agent in the light of his own knowledge of conditions, derived from personal observation and travel over the State, which he is required to do a couple of times a year. There is one located in each State, and there are now 44, and the black disks on the map [exhibiting the same] show the official stations of each of these agents. These State agents have corps of assistants or correspondents within their States, ranging from 200 or 300 in the smaller States up to 600 or 800 in the larger States.

As to the methods of the State statistical agents; they have sent to them each month, in bulk, supplies of these schedules [exhibiting] which they transmit to their aids or assistants throughout the States, and which are returned to them in franked envelopes. The results they tabulate on uniform tabulation sheets [exhibiting]; properly weighting the different counties, and they supplement these reports by information from every other source which they can secure within the States. They are generally representative men, of good repute and with a natural knowledge of agricultural conditions in the State, and often they have a line of business in some way connected with agriculture. They also have authority to travel in the spring and fall preparatory to the issuance of the two important reports as to acreage and yield. They are given an authorization to travel throughout their States to meet their assistants and correspondents and to examine the country in as much detail as they can. The results they formulate into a report and transmit it to the Department each month, as the traveling men do, either by a detailed report with note of weather conditions, or by the code telegraph, giving the gist of that report.

(3) *County correspondents.*—There are approximately 2,800 counties of agricultural importance in the United States. In each of these counties the Department has a principal county correspondent who maintains an organization of several assistants. These county correspondents are selected with special reference to their qualifications, and constitute an efficient branch of the crop-reporting service. They make the county the geographical unit of their reports, and after obtaining data each month from their assistants and supplementing these with information obtained from their own observation and knowledge, report directly to the Department at Washington.

(4) *Township correspondents.*—In the townships, parishes, or voting precincts of the United States in which farming operations are extensively carried on, the Department has township correspondents who make the township or precinct the geographical basis of reports, which they also send directly to the Bureau of Statistics each month. There are about 33,000 on this list at the present time.

(5) *Individual farmers.*—There are several thousand representative planters distributed throughout the cotton belt who report on the results of their own farming operations; and valuable data are also secured from 30,000 mills and elevators.

(6) *Ginners.*—Reports in the spring and fall as to acreage and yield per acre are requested from the list of cotton ginners, varying from 27,000 to 30,000, through the courtesy of the Bureau of the Census.

(7) *Special cotton correspondents.*—There is also a special list of 4,000 bankers, factors, oil-seed firms, and others, selected by reason of their familiarity with cotton conditions in their respective localities.

I will now give a brief résumé showing the scope of the crop reports, or the products reported upon.

Eleven monthly reports on the principal crops are received yearly from each of the special field agents, county correspondents, State statistical agents, and township correspondents, and one report relating to the acreage and production of general crops is received during the year from individual farmers.

Six special cotton reports are received during the growing season from the special field agents, from the county correspondents, from the State statistical agents, and from township correspondents, and the first and last of these reports are supplemented by returns from individual farmers, special correspondents, and cotton ginner.

The general reports for January and February are combined on one schedule and relate to the number and value of farm animals.

The general report for March relates to the stock of grain in farmers' hands, the distribution and consumption of corn, wheat, and oats, and the average weight per bushel of wheat and oats.

Reports on the condition of the crops of the year begin with the April report, when the condition of winter wheat and rye is dealt with, prevailing diseases of farm animals, and losses from disease and exposure.

The report for May comes at a time when few of the crops are sufficiently advanced for their condition to be reported upon; consequently the inquiries relative to condition apply only to winter wheat, rye, meadow mowing lands, and spring pasture. This schedule also deals with the portion, if any, of the original acreage sown to winter wheat that for any reason has been or will be abandoned, and contains inquiries with regard to farm labor and tenants.

The schedule for June deals with the acreage of six crops, the most important of which is spring wheat. It also covers the condition of wheat, oats, barley, rye, clover, spring pastures, apples, peaches, and rice.

The July schedule deals with the acreage of corn, potatoes, tobacco, and sugar cane; the stocks of wheat in farmers' hands; the average condition of all the principal crops, fruits, and spring pastures, and the average weight of wool per fleece.

The August schedule deals with the average yield of winter wheat per acre, acreage of buckwheat and hay, the condition of the principal crops, the quality of clover hay, and the stocks of oats in farmers' hands.

The September schedule deals with the condition, when harvested, of wheat, oats, barley, and rye; the acreage of clover seed; the production of peaches, and the number and condition of stock hogs on hand for fattening.

The October schedule deals with the average yield per acre and the quality of spring wheat, barley, oats, rye, and hops, and the condition of corn, potatoes, sugar cane, tobacco, rice, and apples.

The November schedule deals with the average yield per acre of corn, buckwheat, potatoes, hay, tobacco, and rice.

The December schedule deals with the production and farm prices of all the principal crops, and the acreage of winter wheat and rye sown for the crop of the following year, and also the condition of winter wheat and rye.

In addition to the foregoing, the reports during the past two years have been extended to include condition figures of many small fruits, vegetables, and minor products. Information in regard to such products has been urgently requested, and, as a basis for comparison has now been satisfactorily established, the reports are received with interest and favorable comment.

As to the transmission of the schedules and reports to Washington and the method of handling them previous to the preparation and

issuance of the Bureau's reports each month, the correspondents of the several classes send their reports separately and independently to the Department at Washington. I may add that within the last couple of years very strict orders covering the receipt and handling of the reports and schedules have been prepared and are now followed. In regard to all so-called speculative products, such as cotton, wheat, corn, and oats, the reports in relation to which would tend to influence the market and affect the market prices of those products, the reports are received as follows: The traveling and State agents send their reports in red-addressed envelopes marked "Special A," under special delivery. If the agents are located beyond the Mississippi River, they transmit their reports by telegraph, using a cipher code which we have prepared [exhibiting]. By use of a different key word each man has a different code. There is an inner disc with certain code words revolving on an outer disc with numbers. We give a different key number to each agent and have them governed accordingly. In transmitting their reports, for example, an agent wishes to report the cotton condition as 75. He would know what code key word to be governed by, and after setting the disc would turn to 75 on the outer disc and report "cotton weapon" in two words.

Another agent wishing to report the same number would send, "cotton seal," and so on. The idea is that their figures come to Washington by telegraph, in cipher, the day before the report is issued, and that every agent has a different code; so that no one could have an idea of what any agent's report is. Those telegrams immediately upon receipt here are handed to the Secretary of Agriculture by the telegraph operator located in the Department of Agriculture building, and by the Secretary immediately placed in his safe. These red addressed envelopes, "Special A," in relation to speculative crops, are received by the postmaster here, and by an arrangement which the Secretary has with the postmaster they are immediately placed in a locked mail sack, the only key to which is held by the Secretary of Agriculture. The mail sack is brought to his desk, opened by him, and the reports immediately placed in that safe. There they remain unopened and carefully guarded until the morning of the day on which the report is to be issued, when the Secretary of Agriculture comes to his office, opens that safe himself, and brings the reports to the rooms of the statistician and the crop reporting board, as it is called, for their use.

Mr. STANLEY. And that reporting force also sits in secret session, does it?

Mr. CLARK. It sits in the office of the statistician, no one being permitted to leave or come into the office or Bureau and all telephones are disconnected and strictest orders for secrecy prevail.

The reports from the different classes of individual correspondents that come to the bureau can not naturally all be placed in the safe. They must be tabulated and a State figure arrived at. It is done in this way: The schedules, after being received in the office, are tabulated by States. For example, here is one of the tabulation sheets [submitting same] for the month of August for the State of Kansas, a general schedule. That box heading is similar to the information called for on the schedule for that month. As each county correspondent's report comes in it is set down on the left-hand column of

this sheet. The condition figure which he reports is placed after the name of that county. After they are all posted for a State they are not added up and divided by the number of reports received, but they are weighted in order to secure a weighted average for the State. That is, they are weighted according to the relative value of each county in the agriculture of that State.

For instance, Douglas County is given a weight of 7, and Lynn County a weight of 10, and Comanche County a weight of 1. Those figures are gotten by the acreage figures of the Census, and might stand for 7,000 and 10,000 and 1,000 acres respectively, the three last figures having been eliminated. Then if that is multiplied by the per cent. figure for each county, an extension is secured; and after they are all entered, the total of weights are added and divided into the total of the extensions, and the result is a weighted average for that State.

In order that the State figure arrived at may not be known to any clerk in the office, a couple of years ago we inaugurated a plan of cutting off or bisecting the sheets. Partial additions are made during the progress of tabulating to secure dispatch in closing up the report. Now as these reports come trailing in, the clerks made the extensions and partial totals. As the additional reports were received, they were brought down to date upon the day before the final report.

This sheet [indicating] was marked on the upper half by the chief of the Crop Reporting Division, who marked the lower half with the similar numeral here. Then this sheet was cut off here and here [indicating], the reports from the largest counties of the State being entered on the bottom part, but no extension made. That upper part of the sheet is then folded up and brought into the statistician's office, and, in the case of cotton, the sheets for the States of Texas and Georgia are immediately taken over to the Secretary's office and placed in his safe. There is no evidence on the cut-off sheets as to what States they relate. The figures for the lower part of the sheets are then completed on the day before the report, and the averages for the States arrived at, and these sheets brought into the statistician's room, where they are assembled and the State figures taken off on the morning of the crop report after the board has assembled. By these methods there is no possible way in which any information relating even to the total for any one State can be ascertained by any individual previous to the day on which the report is prepared.

We have traced the statistical organization from the sources of information and the methods of gathering the data to the transmission of reports and receipt at the Department, and I shall now outline the processes followed in the preparation of the final reports.

The work of making the final crop estimates each month culminates at a session of a crop-reporting board composed of four members, presided over by the statistician or chief, Bureau of Statistics, as chairman. The services of the four members are brought into requisition each crop-reporting day from among the statisticians and officials of the Bureau and the special field agents and State statistical agents, who are called to Washington for the purpose.

The personnel of the board is changed each month. The meetings are held in the office of the statistician, which is kept locked during sessions, no one being allowed to enter or leave the room or the bureau, and all telephones being disconnected.

When the board has assembled the reports and telegrams regarding speculative crops from State and field agents, which have been placed unopened in a safe in the office of the Secretary of Agriculture, are delivered by the Secretary, opened, and tabulated; and the reports, by States, from the several classes of correspondents and agents relating to all crops dealt with are brought together in convenient parallel columns on final tabulation slips; the board is thus provided with several separate estimates covering each State and each separate crop, made independently by the respective classes of correspondents and agents of the Bureau, each reporting for territory or geographical unit with which he is thoroughly familiar.

Abstracts of the weather condition reports in relation to the different crops, by States, are also prepared from the weekly bulletins of the Weather Bureau. With all these data before the board, each individual member computes independently, on a separate sheet or final computation slip, his own estimate of the acreage, condition, or yield of each crop, or of the number, condition, etc., of farm animals for each State separately. These results are then compared and discussed by the board under the supervision of the chairman, and the final figures for each State are decided upon. It has been interesting to note how often the reports of the different classes of correspondents and agents are very nearly identical and how closely the figures arrived at independently by the individual members of the board agree. The estimates by States, as finally determined by the board, are weighted by the acreage figures for the respective States, the result for the United States being a true weighted average for each subject.

There have been 18 meetings of the crop reporting board during the past year, in most of which the personnel has been changed each month. Six special field agents, specialists in their respective lines of statistical and crop knowledge, and eight State statistical agents have served in the different board meetings. Many of these men are widely known throughout the United States, and the practice of having them take part in the preparation of the monthly crop reports and estimates has proved highly satisfactory, and has been a great factor in establishing the confidence of the public generally throughout the country in the fairness and correctness of the bureau's estimates.

The final step is issuing and disseminating the reports, which I will briefly outline.

Reports in relation to cotton, after being prepared by the crop reporting board, and personally approved by the Secretary of Agriculture, are issued on the first or second day of each month during the growing season, and reports relating to the principal farm crops and live stock are prepared and made public on the ninth or tenth day of each month. In order that the information contained in these reports may be made available simultaneously throughout the entire United States, they are handed, at an announced hour on report days, to the press associations, all applicants, and to the Western Union Telegraph Company and the Postal Telegraph Cable Company, who have branch offices in the Department of Agriculture, for transmission to the exchanges and to the press. These companies have reserved their lines at the designated time, and forward immediately the figures of

most interest. A mimeograph or multigraph statement, also containing such estimates of condition or actual production, together with the corresponding estimates of former years for comparative purposes, is prepared and sent immediately to exchanges, newspaper publications, and individuals. The same afternoon printed cards containing the essential facts concerning the most important crops of the report are mailed to the 77,000 postoffices throughout the United States for public display, thus placing most valuable information within the farmer's immediate reach.

Promptly after the issuing of the report, it, together with other statistical information of value to the farmer and the country at large is published in the Crop Reporter, an 8-page publication of the Bureau of Statistics, under the authority of the Secretary of Agriculture. An edition of over 120,000 is distributed to the correspondents and others interested throughout the United States each month.

Mr. STANLEY. Speaking of these black disks on the map—it is the first time I have ever heard an explanation of this crop service—is the man represented by the black disk expected to form a definite idea of the crop conditions in the territory which would broadly be assigned to him and including the country adjacent to the place where he is located? In other words, take the man out here in Idaho: Is he expected to form a definite idea of all that outlying territory?

Mr. CLARK. Yes, sir; each month he has the schedules containing the inquiries for that month sent to him in good time before the date to which the report relates, and he will travel to the principal points in the important agricultural sections of that district assigned to him and interview the traffic agents of railroads, bankers, elevator and grain men, and everyone who will be expected to have an idea of the growing conditions of the crops and of crop prospects. He will also visit the fields himself in the principal sections, and note the progress of the crop; note the presence of rust, or Hessian fly, or smut, or other injurious influences to grain.

Mr. STANLEY. Does his report purport to be more than an approximate estimate or general review of the conditions?

Mr. CLARK. His report will simply reflect an approximation of the crop conditions. In the early spring he states definitely what increase or decrease, in per cent, has been planted to a certain crop as compared with the preceding year, and, during the growing season he states specifically the percentage of its condition that month as compared with a normal giving promise of a full crop.

Mr. RUCKER. When you say "specifically," do you mean accurately or approximately?

Mr. CLARK. Approximately. He will report a specific figure, giving his estimate or approximation of the conditions that exist there.

Mr. RUCKER. Of course he could not, where he is required to make a report, visit even each county in his territory, much less each town?

Mr. CLARK. No, sir; his work can not be so detailed as an enumeration.

Mr. LEVER. This is the traveling field agent?

Mr. CLARK. Yes, sir.

Mr. STANLEY. I notice one district on the map; there is Texas, Louisiana, and New Mexico.

Mr. CLARK. We have south Texas assigned to one man, north Texas and Oklahoma to another man, and New Mexico and Arizona covered by a third man.

Mr. STANLEY. I believe one man covers Ohio, Indiana, Illinois, Michigan, and Kentucky?

Mr. CLARK. Yes, sir.

Mr. STANLEY. That is a right considerable area.

Mr. CLARK. Yes; that is a large territory for one man to cover.

Mr. STANLEY. That is the largest, is it not?

Mr. CLARK. That is the largest, from the agricultural standpoint, assigned to one field agent.

Mr. STANLEY. That group of States has a greater variety of crops than other States in the Union? Is not that a fact?

Mr. CLARK. Yes, sir. We are planning to reduce the size of this large district and place part of it under another agent, and such an additional agent is asked for in the estimates for next year, before the committee.

Mr. LEVER. How often do you report upon tobacco?

Mr. CLARK. We report upon tobacco in July as to the acreage and condition, then as to the condition for three months, and then as to the yield per acre in November; and we then reduce to a quantitative estimate or a production figure by applying the yield per acre to the acreage figure already arrived at.

Mr. STANLEY. In your reports upon tobacco I believe you take Kentucky and Tennessee and report so many pounds to the acre, and so many acres of tobacco. You do not differentiate the types or kinds of tobacco?

Mr. CLARK. No, sir; not as regards acreage and production figures.

Mr. STANLEY. I was going to suggest, Mr. Chairman, that that renders the tobacco report absolutely valueless for practical purposes. All the tobacco in western Kentucky and western Tennessee goes to Europe—90 per cent of it. It has no sale here whatever, except for snuff, or fertilizer, or something of that sort. The Burley, none of it goes abroad, and it has no sale in the foreign markets. The people of Kentucky and Tennessee, especially those who are attempting to market their own crop by pooling their tobacco and selling it themselves, are especially anxious to know the amount of tobacco raised as dark tobacco and export tobacco and the amount of Burley; and two reports could be rendered, I think, just as easily as one, and it would differentiate the tobacco and render that report very valuable to the people of those sections.

The CHAIRMAN. You mean there should be an estimate on the production of dark tobacco, and an estimate on the production of light tobacco. Is that the distinction?

Mr. STANLEY. Yes; White Burley and all other tobaccos. They are separated by the soils. It has just as different a habitat as cotton and corn.

The CHAIRMAN. Has that matter been brought to your attention, Mr. Clark?

Mr. CLARK. Yes, sir; and the Department is now working on a plan by which it hopes to secure statistics of tobacco by types. The difficulties surrounding tobacco statistics are very great. They have been a source of difficulty to the Department for years. In a special effort to gather every available source of information bearing on the sub-

ject the Secretary has appointed a special tobacco agent, in addition to the traveling agents, who has a commission to travel to all sections of the country in connection with tobacco statistics.

Mr. STANLEY. Yes.

Mr. CLARK. The units of our reports each year for a long series of years have been the States. The State is the smallest geographical division that we report for. It is obvious that it would be very difficult and practically impossible to prepare estimates for so small a unit as the county. The Census Bureau, in its enumerations every ten years, gives detailed information by counties.

Mr. STANLEY. Not to interrupt you, I notice that you follow State lines. This tobacco area is as large—there is as much dark tobacco raised—as would cover the whole State of Kentucky, and it runs to Tennessee. One hundred and sixty million pounds of tobacco are tied up in Kentucky. I state that to show how vital that is. It could be sold to-morrow if we knew either how much White Burley tobacco has been produced in the last five years or how much the American Tobacco Company had on hand. It is simply a question whether the tobacco company is out of stocks or not, or whether we have overproduced. They say we have, and we say we have not. That would affect the sale of 160,000,000 pounds of tobacco, valued at 15 cents a pound.

I would suggest that this report be made differently, if possible. We are indifferent as to how much is planted in corn, but it is a matter of curiosity, and it is a good thing to know, although it does not affect the price of it. I doubt if an accurate knowledge of the amount of wheat raised in the United States would affect the price per bushel, because it is an immaterial part of the wheat produced in the whole world. But this being all produced down here—this tobacco—and there being but one buyer, and I think only one seller—or will be after awhile—it is very vital.

The CHAIRMAN. The only reason for the existence of this bureau at all is to provide an impartial estimate that shall stand between the producer and the purchaser.

Mr. STANLEY. That is what we want. We know we can get a just and unbiased report if we get it from the Government. We have no means now of knowing how much tobacco there is of that kind except the statement made by the purchaser.

The CHAIRMAN. We will be glad to have that information.

Mr. CLARK. As Mr. Stanley suggests, our reports upon tobacco being by States, and having been so for years, do not settle the question of the amount of different types of tobacco in the States where more than one type of tobacco is raised. In the New England States, New York, Pennsylvania, Georgia, Florida, and Wisconsin, where the type is coextensive with the State lines, it is an easy matter to arrive at the amount of tobacco of such types. But in the States of Kentucky, Tennessee, Ohio, Virginia, and the Carolinas, where more than one distinct type grows within the State, it is very difficult to segregate the line of counties that separate the types, unless there has been a regular county enumeration.

Mr. STANLEY. You could do that. Your traveling man could do that with his eye.

Mr. CLARK. We have been making a study of that within the last year.

Mr. STANLEY. Any man could do that. The two kinds are as different as roses and pinks in the fields in their appearance, and no county raises both White Burley and dark tobacco. They are separated by an intermediate territory always.

Mr. CLARK. We have our tobacco expert now working along that line. We have segregated the different types of tobacco by counties in those States according to the Twelfth Census reports, and according to any subsequent State reports where we can get such information, and then we will try to arrive at a percentage in that State of the different types. Their growth varies quite largely in some cases near the line of meeting.

Mr. STANLEY. I was going to suggest there, Mr. Chairman, that that is the trouble of telling the type. Mr. Ewing, of Tennessee, at his own expense, and then at the expense of the protective association, has ascertained approximately the area of the dark tobacco and in a rough way the amount of tobacco grown. But that is not authentic. It has not any weight as authentic information except with the association.

The CHAIRMAN. It seems to me if the types of tobacco were bounded by county lines it would be a comparatively easy matter to reach an estimate on it.

Mr. STANLEY. It would be very valuable to us. In addition to that, this same type of tobacco is raised in Virginia—this Austrian export tobacco.

The CHAIRMAN. As I understand it, Mr. Clark tells us that the bureau realizes the importance of the distinction you have suggested, and is trying to work it out.

Mr. CLARK. In that connection we have entered into cooperation with the Bureau of Internal Revenue of the Treasury Department. The Secretary of Agriculture has had the consent of the Secretary of the Treasury, and we have met with a very willing cooperation with the Office of Internal Revenue, and they have had inserted in the reports made by all dealers in leaf tobacco a requirement for the amount received from farmers and then have had the data compiled in the Office of Internal Revenue by districts. In that way we will be able to check our reports, because we know the internal revenue districts which deals with certain types. We have completed six months of that cooperation, and when we are able to secure the reports for another six months we will probably be able to make quite a valuable statement along that line.

Mr. STANLEY. By separating your tobacco into types, Mr. Chairman, instead of having both to do the same work and duplicate your work, it will complement, for the reason that the internal revenue is collected almost entirely, with the exception of perhaps 10 or 15 per cent, on the light tobacco, and if we could find out just the amount of tobacco on which tax is paid and the character of that tobacco we could with our own endeavors approximate the amount of dark tobacco.

The CHAIRMAN. Is not that information available to you as a matter of public record?

Mr. STANLEY. It is not available. They keep an estimate of the amount of tax paid. I was going to make an inquiry, but I do not know whether to make it through this committee or in the way of an

inquiry in the House by a resolution, to find out both the amount of tax paid and by whom paid. I want to do that right away.

The CHAIRMAN. It would seem to me that that is a matter of public record.

Mr. LEVER. As a matter of fact, Mr. Clark, do the State men actually travel over their territory, or do they stay in their own central office and have their correspondents report to them? Do they do any traveling?

Mr. CLARK. Yes, sir. This committee gave the bureau an increased appropriation last year and the year before in part for that very purpose, and instructions were at once given to the State agents to travel, and nearly all of them have traveled during the last two years.

Mr. LEVER. Do they visit the various county seats?

Mr. CLARK. Yes, sir; in as much detail as they are able to.

The CHAIRMAN. As a result of this change in the system by which these State agents are now permitted to travel, do you think you receive any benefit?

Mr. CLARK. Yes, sir; we have noticed an apparent betterment of their reports. A more accurate and apparently more consistent series of reports have come from the State agents since they have been permitted to travel and since we have been installing in all their offices uniform methods and stricter regulations as to their methods. The reports from the special field agents have also improved since an enlarged appropriation has enabled the Bureau to increase their number and to assign each man a smaller territory.

The CHAIRMAN. Do you think your estimates are more accurate now than they were formerly?

Mr. CLARK. Yes, sir. I am quite sure they are.

Mr. HEFLIN. How many agents do you have who actually travel over the cotton belt?

Mr. CLARK. We have six special field agents or traveling men who devote all their time to work in the cotton belt—the sections as shown by these lines of demarcation on the map [indicating on map].

Mr. HEFLIN. Where are their headquarters?

Mr. CLARK. The agent for Virginia and North Carolina and South Carolina has his official station in Washington. He is Mr. B. C. White, who has been with the bureau for ten years, and who is a Southern man with experience in Census work. In Georgia the agent is located near Atlanta. He covers the States of Georgia and Florida. His name is Mr. T. C. Shaw, a man who has been with us nearly four years and who has had quite an experience in traveling along the Atlantic coast in connection with agricultural statistics. He is a native of South Carolina and has experience in cotton manufacturing. In the section of Alabama and Mississippi and Tennessee we have an agent—his home is at Laurel, Mississippi—Mr. W. L. Pryor, connected with the Department for three years. He was formerly a cotton grower and planter, with experience of two years in the Census Bureau. For Arkansas and Louisiana there is an agent located at Lonoke, Ark.: "Judge" H. T. Bradford, formerly commissioner of agriculture of Arkansas for four years and later our State statistical agent. For northern Texas, covering about one-third of the cotton section of Texas, and Oklahoma we have a man who covers those sec-

tions, located at Guthrie, Mr. F. W. Gist, also a Southern man and cotton planter originally, with experience in the Census Bureau. For the southern part of Texas there is an agent located at Houston, Mr. F. N. Gray, a native Texan and highly recommended to us as a reliable and honest man.

Mr. HEFLIN. How do these men secure their offices?

Mr. CLARK. They secure their offices by having been recommended to the Secretary along with different candidates for the positions, and having been indorsed and recommended by cotton men and representative men in the South. They are men whose records have been carefully examined into by officials of the Department.

Mr. STANLEY. As I understand, you try to secure men with both practical and theoretical knowledge of the crops they are detailed to inspect?

Mr. CLARK. Yes, sir.

Mr. HEFLIN. How do they obtain their local agents?

Mr. CLARK. You mean the traveling men?

Mr. HEFLIN. These State statistical agents; how do they secure their local reporters?

Mr. CLARK. They are largely selected from their personal friends located throughout the State. For instance, in Georgia the bureau has ex-Governor Northen as the State agent, a man who was several years in the Georgia legislature, later governor of Georgia, and who has been since then president of the Georgia State Agricultural Society. His career has brought him in touch with representative men and secured him many friends and acquaintances throughout the State, and he has enlisted them to assist him in his reporting.

Mr. STANLEY. Who is your Kentucky State agent?

Mr. CLARK. The State agency for Kentucky is now vacant, the agent who has filled the position for several years having recently resigned.

The CHAIRMAN. What salary are these State agents paid?

Mr. CLARK. They range from \$300 to \$900 a year, and naturally they are not supposed, and are not required, to devote their entire attention to this work. They could not, on a compensation such as that. The work, as we at present formulate it, does not require their entire attention except in the spring and fall, when they are required to travel.

The CHAIRMAN. Their local agents are entirely volunteers?

Mr. CLARK. Yes, sir; they are voluntary agents, receiving in return for their services the monthly Crop Reporter, which is published by the bureau, containing crop reports and other statistical matter, and an allotment of seeds, and the Horse Book, the Yearbook, and the book on Diseases of Cattle, and such publications as the Department can give them.

Mr. HAUGEN. Are State agents employed in all the States?

Mr. CLARK. Yes, sir.

Mr. HAUGEN. Is there work for them all in all these States? There are some States without crops.

Mr. CLARK. The Territory of Arizona and the Territory of New Mexico have one man covering both Territories, and the New England States have a man located in each State. He receives a very small salary, about \$300 a year, and keeps a small list of aids, and

covers the State in his reports as to live stock and local crops growing there.

Mr. LEVER. What is the grand total of all your agents?

Mr. CLARK. The grand total is about 150,000 for the United States, about 50,000 of whom are in the cotton-producing States.

The CHAIRMAN. State to whom these various classes of correspondents report. Begin at the top and say who your field agents report to, and so on.

Mr. CLARK. Very well. The special field agent reports directly to the Bureau of Statistics each month. Each State statistical agent, with a corps of assistants, formulates a report and sends the same information as has been reported by the field men and all the other classes of correspondents also direct to the Department each month. Then the county correspondents—on a schedule which has been printed here and transmitted to them each month with an enclosed return envelope, together with the Crop Reporter and other data that we may want to send him that month—they report direct to the Bureau each month, and the returns of all of them are properly weighted and tabulated by a regular scientific statistical system in the bureau, and the State figure arrived at.

Then as to the township correspondents: The schedules are transmitted to them, and the information comes from them in a manner similar to that from the county correspondents, and is tabulated here in Washington in a separate section from those of the county. The information is asked of the ginners only in the fall as to the yield per acre when the principal report is made up on cotton, showing the acreage abandoned and the yield per acre. These reports are secured by having the ginners on the lists of the Census Bureau send return schedules to the Bureau of Statistics. Then as to the individual farmers, the information is secured in the spring and fall from them in the same way as it is secured from the county and township correspondents, their reports coming to Washington and being tabulated distinct and separate from the other classes of agents.

The CHAIRMAN. Then I understand that the reports from every class of your reporters come directly to the bureau here in Washington?

Mr. CLARK. Yes, sir, excepting the assistants or aids which the State agents and county correspondents have.

The CHAIRMAN. That being the case, can you give us an estimate of about the number of separate and distinct reports that come here and are given consideration in making up, for instance, the December cotton estimate?

Mr. CLARK. I will eliminate the group of correspondents and assistants that the State agents have, which will list about 7,000 or 8,000, but they report directly to the State agent, and the gist of their report, supplemented by other information that he may have, is sent to us. Then the total number taken into consideration aside from them is about 45,000.

The CHAIRMAN. Forty-five thousand separate and distinct reports?

Mr. CLARK. Yes, sir.

Mr. HEFLIN. You stated a little while ago that you obtained reports on the cotton crop in the spring and fall.

Mr. CLARK. Yes, sir.

Mr. HEFLIN. You do not have reports made in the month of July and August? Sometimes we have a drought then, or too much rain, and that would woefully affect the crop.

Mr. CLARK. I was referring then to the reports and information gathered from these ginnerers, individual farmers, and special correspondents. From them we only request a report in the spring and fall, but we do request information from the other four classes of correspondents—field, State, county, and township—during the growing season of the cotton crop, and from their reports we prepare a report as to the condition each month, beginning with June and going on with July, August, September, and October.

Mr. HEFLIN. Don't you think it would be advisable to continue the information coming from these sources—the farmers themselves—through the months of July, August, and September? Don't you think it would help you come nearer to the truth to get a report direct from the man producing the cotton?

Mr. CLARK. Many of the county and township correspondents are themselves producers. With some additional assistance in the office here we could send inquiries to the lists of individual farmers and special cotton correspondents and tabulate and consider them with the other sources.

The CHAIRMAN. Do you think it would add materially to the accuracy of the estimate of conditions?

Mr. CLARK. I think it would give us some additional sources of information that would tend to add to the accuracy of the reports; yes, sir.

The CHAIRMAN. Can you give us an estimate of about how much more it would cost?

Mr. CLARK. With the improved methods that we have recently introduced in the bureau, it would not be very much additional. We have installed quite a number of electrical adding machines and multiplying and dividing machines, and envelope-addressing and sealing machines and multigraphs, and we are able to do the work more rapidly and issue the report more promptly than heretofore, and I think with the addition, say, of three or four of those machines and a couple of clerks, we could probably do it. The additional cost would be about \$3,500.

Mr. STANLEY. Right at that point: If Members of Congress, for instance, would furnish the Department with a list, say, of 500 or 1,000 leading planters in their districts to whom these questions could be sent, to be answered gratuitously, would it materially assist you?

Mr. CLARK. I think it would; yes, sir. It would benefit our lists, the idea being that not all of these correspondents listed with us at the present time will report every month. There will be personal considerations and business that will interfere with it, and they do not receive compensation, and they do the work from the view point of public-spirited citizens and to assist the service, which benefits them.

Mr. HEFLIN. Just there, Mr. Chairman, I want to say that this would be a great help and be very beneficial to the producers of cotton, because in my own county I have seen splendid cotton crops right around the city, where the man who lived at the county seat would

report, and yet I have seen very poor cotton only 8 or 10 miles out in the county, so that this man would report a splendid crop, and the people out in the rural districts would have a very poor crop.

The CHAIRMAN. Ought not the correspondent take notice of the poor crop out there, and post the State agent?

Mr. HEFLIN. I have feared myself that was not the case. We do not know that they will report promptly. If it takes a little money to travel out they may not go.

The CHAIRMAN. Naturally the greater number of observers, the more likelihood of the result being correct.

Mr. STANLEY. Is it within the authority of the Department for you to furnish the blanks, stating to those individual farmers that at the request, say, of the Member from that district, they are asked to furnish that report gratuitously? Is that within the purview of your power? I believe in that way the man receiving the notification would take special pains and care to furnish the information.

Mr. CLARK. We could ask him in view of these circumstances if he would be willing to assist the Department and to be listed as one of its correspondents, and we would reciprocate as far as possible, and thereby improve our lists, no doubt.

Mr. LEVER. Do any considerable number of your correspondents on the list fail to report now?

Mr. CLARK. From 25 to 30 per cent fail to report.

The CHAIRMAN. How often do you revise these lists?

Mr. CLARK. We revise them continuously. We have a careful card index and a record of every man's reports, and we go through that continuously and eliminate the names of correspondents who do not report regularly. The lists are added to from time to time, just according to such methods as are suggested by Mr. Stanley. It is done by addressing postmasters and asking them for the names of representative farmers in the vicinity. We would be assisted by the means suggested.

Mr. STANLEY. I was going to say that the character of the information in these reports is very highly thought of by the people in my district.

Mr. LAMB. Would not the sheriffs and tax collectors of these counties, traveling about, act as your agents and reporters?

Mr. CLARK. Yes, sir.

Mr. LAMB. When I was sheriff of my own county in Virginia I made reports to your department for years.

Mr. CLARK. We have a number of correspondents who have been reporting for thirty-five years, and quite a number who have been acting in that capacity from twenty-five to thirty years.

Mr. STANLEY. Could you give us an estimate of the necessary cost to add to this information in the way suggested by Mr. Heflin in the way of new machines and clerks and let it be incorporated in this bill? You can add that to your remarks and make a memoranda of it.

Mr. CLARK. About \$3,500.

Mr. HEFLIN. Is the personnel of the crop reporting board known to the public?

Mr. CLARK. No, sir; not until after the publication of the report. The crop reporting board is composed partly of the statisticians in

the bureau at Washington, together with members of the special agents or State statistical agents who are called to Washington each report day for service on that board. The board changes from month to month, and from one crop to another. In the case of cotton, we generally have two statisticians at Washington on the board and two members of the field service from the South. We will bring a field agent, a traveling agent in this Western country [indicating on map], and a State agent from this Eastern country, together with the statisticians, and form the board for that month, and the personnel of the boards changes each month. It is not published or known previously to the crop report day who shall serve on that board.

Mr. HEFLIN. How long are they in session, usually?

Mr. CLARK. The board meets at 7 or 8 o'clock in the morning, according to the length of the report to be prepared; and in the case of cotton during the past year we have been able to prepare the report and have it ready for publication by 1 o'clock.

Mr. HEFLIN. That same day?

Mr. CLARK. Yes, on that same day; and in the case of grain reports, it is 1 o'clock and sometimes as late as 4 o'clock before it is prepared and issued.

Mr. HEFLIN. Is there an oath to which the members of this board subscribe, that they will keep all matters secret pertaining to this report and the announcement of the estimate?

Mr. CLARK. There is no separate oath that they take. There is the oath of office that all employees are required to take, and, of course, they are governed by strict directions and instructions as to secrecy.

Mr. STANLEY. What are the pains and penalties denounced against violations of secrecy? What are the statutes now as to that?

Mr. CLARK. I can speak only generally of that. There is no specific act relating to that case, and no penalty. There has been a section recently added to the penal code which has been before the House, attaching a severe penalty to such specific offense.

Mr. HEFLIN. That is for giving out false information.

Mr. CLARK. False information or advance information in relation to reports, applying, of course, to all Executive Departments, to the Census, and the Department of Commerce and Labor, and the Agricultural Department as well.

The CHAIRMAN: Are there any members of this reporting board who are always members of it?

Mr. CLARK: Yes, sir; the chief of the bureau is chairman of the board—the permanent chairman of the crop-reporting board—and the associate statistician and assistant statistician at Washington are nearly always permanent members of that board; also a former assistant statistician, who is now chief of one of the divisions in the bureau.

The CHAIRMAN. Suppose that some member of that board wished to have the report indicate a very large cotton crop. Would there be any way by which he could manipulate the figures before him in such a way as to bring about that representation without being detected by the other members of the board, or would it require collu-

sion on the part of all the members of the board in order to falsify the returns?

Mr. CLARK. It would require collusion among all the members, because of the methods pursued in that board meeting at which the report is made. They are as follows: The information from each class of agents is compiled on the morning of the crop report and meeting of the board, by computers who are in the office, and the figures are placed on sheets similar to this [indicating] in parallel columns. Opposite each State is placed a figure from the field agents, another figure from the State agent, a figure from the county and township correspondents, and additional correspondents' reports, and the ginners, and special correspondents and individual farmers. One of those sheets is given to each individual member of the board, who sits at a separate desk, and personally prepares a figure for the State, from those sources of information which he has.

The CHAIRMAN. Are all the members of the board furnished with similar sheets?

Mr. CLARK. Yes, sir.

Mr. HEFLIN. Each one of these men making up this report figures it out himself and announces the result?

Mr. CLARK. Yes, sir; he prepares this sheet [indicating]. There are other sources of information which the board may have before them, such as the field notes of the State agents and traveling agents; a written report referring to abnormal conditions prevailing, or other extraneous conditions affecting the crop in his territory. There are also the Weather Bureau reports, from which a careful compilation has been made by States, and they are read State by State as each individual State is taken up by the numbers—read aloud in the board meeting. Finally, when the entire sheet is compiled the figures of the different members of the board are assembled by States on another sheet. The computers immediately copy off the figures that the individual members of the board have arrived at, and set them down in four parallel columns opposite each State. For instance, here [exhibiting] would be Holmes, Murray, Jefferson Johnson, and Governor Northen in four parallel lines, with the figures opposite each State. Then the chairman of the board takes that figure up and the board assembles around the board table and follow the States down.

For instance; in North Carolina we have condition; 74; two 75's; and 76, as the official figures of the different members of the board. "Gentlemen, what figures shall we select?" If it is a case like that, and they are all agreed to select 75, that figure is placed down opposite North Carolina as the State figure. Each State is taken up in a regular order in that way.

Mr. STANLEY. Each man's addition is taken, is it?

Mr. CLARK. It must be a consensus of opinion of the entire board. There may be a discussion and argument over what figure may be selected. In that case all the information bearing upon that State is brought up and gone over.

Mr. STANLEY. Is that a question of judgment, or a question of accuracy of figures?

Mr. CLARK. There would be a question, if we had two 74's and two 75's, whether 74 or 75 should be adopted.

Mr. STANLEY. Is not that a question of addition?

Mr. CLARK. The figure is only reported in a whole number.

Mr. STANLEY. It would be a question as to which fraction should be taken?

Mr. CLARK. Yes, sir. When the final figures of each State have been arrived at, the figure for the United States is secured by weighting the States just as I have explained the weighting of the counties, and the resulting figure is the figure for the United States as to that report.

Mr. LEVER. Mr. Clark, is there any rule or regulation by which the report of the board is governed as to the relative weighting given to each source of information?

Mr. CLARK. When each individual member of the board is considering the different sources of information, it must be a question of judgment in part, rather than a straight averaging of all the sources of figures, for this reason: We may have a variation between the different agents here as to their accuracy in the past, and as to their ability, from their past reports, to approach the truth and to approach the exact conditions in their States.

Mr. LEVER. Take the State of Texas, where you have a traveling agent and also a State agent. Suppose there was a difference of opinion as between those two sources of information. What attitude would your crop-report board take in reference to that?

Mr. CLARK. In that particular case the individual members of the board have a very high regard for Mr. Jefferson Johnson, the former commissioner of agriculture for Texas, and a man who has a very intimate idea of conditions there and whose past reports have been very close to the final results.

Mr. LEVER. Is he the State agent?

Mr. CLARK. Yes, sir.

Mr. LAMB. And the personal equation enters into it?

Mr. CLARK. Yes, sir.

Mr. LAMB. That was stated here along this same line two years ago.

Mr. COOK. In your recapitulation for last year of the total number of bales of cotton produced in this country how did your figures agree with those of the New York Cotton Exchange and the Memphis Cotton Exchange?

Mr. CLARK. The Memphis Cotton Exchange's general estimate was about 11,990,000 bales, a commercial estimate or average of the guesses of individual members on November 29. The Government report, made on the 10th of December, was an estimate of 11,678,000 bales. The average of the estimates of the members of the New York Cotton Exchange was 11,973,000 bales, published November 26.

Mr. HEFLIN. Whose report was that?

Mr. CLARK. That was the report of the members of the New York Cotton Exchange; that is, it was a report similar to one prepared by them each year as the average opinion of, say, 200 members of the New York Cotton Exchange.

The CHAIRMAN. All those estimates were made last November?

Mr. CLARK. Yes, sir. They were all made previous to the publication of the Government crop report, and they were all estimates of the probable total out-turn of cotton for the year 1907-1908.

Mr. STANLEY. What was the real production?

Mr. CLARK. That is not ascertainable as yet.

Mr. HEFLIN. 10,600,000 or 10,700,000 bales?

Mr. CLARK. The total gin returns of the year have not as yet been completed. There will be one more ginners' report, issued on the 20th of March, and you can not accurately ascertain the probable total out-turn until that report is published.

Mr. COOK. Approximately what would you estimate the crop for 1907 at, with your knowledge in your bureau?

Mr. HEFLIN. Now, since the last three ginning reports have been issued.

Mr. CLARK. I have a chart here [exhibiting same], showing the progress of ginning. It may interest you and it will throw light on that subject. I prepared this chart showing the amount of cotton ginned to specified dates during the past four years, as shown by the reports of the Census Bureau of the Department of Commerce and Labor. The Census Bureau issues reports, beginning with September 1st, of the amount of cotton ginned to that date. They secure this information from special agents located in each county in the South, who canvass the gins in their counties and forward reports of these bales to the Census Bureau, which publishes them at a specified date.

As to the amount ginned up to certain dates for the year 1904 there were only monthly periods in the reports. The green line on this chart [indicating] shows the progress of the ginning of the 1904 crop—the largest crop in the history of the country—when there were approximately 13,500,000 running bales of cotton ginned. For 1905, 1906, and 1907 the ginning reports have been issued about every two weeks, from September 1 to January 16, with a final report to March 1 at the period in which cotton is ginned. The red line on this chart shows the progress of this ginning in 1905, the year when there were approximately 10,500,000 bales of cotton ginned. The blue line shows the progress of the ginning for the year 1906, when approximately 13,000,000 running bales were ginned.

Mr. HEFLIN. You mean, by running bales, 500 pounds' weight?

Mr. CLARK. No; bales as they come from the gins, irrespective of the weight, counting round bales as half bales. Last year the running bale averaged 510.9 pounds. This black line shows [indicating] the ginning for the current year up to January 16, the date of the last ginning report, when 10,339,000 bales were shown to have been already ginned from this year's crop.

Mr. STANLEY. That ought to give you 1,000,000 more bales for the next period, March 1.

Mr. CLARK. A million more bales will approximate our estimate, because our estimate is an equivalent of 500 pounds gross weight bales, which is practically the total number of pounds of lint cotton divided by 478, which gives an allowance of 22 pounds for the weight of bagging and ties. Our report, expressed in equivalent running bales, as compared with the weights of last year will approximate 11,450,000 bales.

Mr. HEFLIN. Does not the ginning reports of the census run more with the crop of 1905 than that of 1906?

Mr. CLARK. There are very unusual conditions surrounding the ginning this year, as evidenced on this chart. On December 1 the

ginners' report which had been published just about the time of the issuance of our report on cotton, showed 8,339,000 bales, which was 350,000 bales less than the corresponding report for 1905 in which year there were produced only 10,500,000 bales in round numbers. Yet in the next two weeks of the current year the ginning had so far progressed, as compared with previous ginning periods, that it practically reached the 1905 ginning figure on that date, and in the second ginning report, January 1, passed it.

Mr. HEFLIN. Passed it very liberally?

Mr. CLARK. Yes; about 225,000 or 230,000 bales. It shows that there were certain abnormal conditions existing tending to affect the ginning, and the receipts and movement of the crop, which caused the delay in the ginning. Between October 15 and the middle of December there existed a period of depression, by reason of the money stringency in the South and throughout the country. There was a stoppage in part in the movement of cotton, in the running of the gins, and in the movement of all agricultural products throughout the United States.

Mr. LEVER. But you never have shown a ginning figure of a million bales of cotton in the period from January 16 to March 1, even in 1904?

Mr. CLARK. No, sir. We showed in 1905 and 1906 from January 16 to the end of the ginning year 505,000 bales and 807,000 bales, respectively.

Mr. LEVER. From January 16 to the next gin report, on March 1, we would have to gin 1,000,000 bales of cotton to approximate your estimate?

Mr. CLARK. Yes, sir.

Mr. LEVER. And that is a condition you never had before?

Mr. CLARK. Yes, sir; but at the same time it is interesting to note that during the period from December 1 to January 1 this year there were ginned nearly the same amount as was ginned in 1906, when they raised the 13,000,000-bale crop—namely, 1,617,000 bales.

Mr. HEFLIN. About the same as was ginned in the 1905 crop, too?

Mr. CLARK. No, sir; in that same period during 1905 there were ginned 1,036,000 bales and in 1906 1,713,000 bales, a difference of nearly 600,000 bales.

The CHAIRMAN. When was your estimate published?

Mr. CLARK. It was published on December 10 at 1 o'clock. The ginners' returns for the period up to December 1 were published on December 9 at 10 o'clock.

The CHAIRMAN. Have you ever made any figures to show how close an estimate could be made of a total crop by taking the ginners' report for December 13, say, and averaging the returns from the gins for the remainder of the cotton year—during a period of preceding years?

Mr. CLARK. Yes, sir; we have. We have studied that very carefully. Of course, we have the ginners' returns running back for a series of five years to compare. As the years go by the ginners' reports will be very much more valuable for that same reason. There will be a series of years to which those percentage figures can be referred. We have only three years of the biweekly reports, and this year we had only two years of those reports to compare with. The

monthly reports have been issued since 1902. We had five years of them. But this year afforded the best evidence of the difficulty of approximating the percentage of the crop ginned to certain dates by comparison with previous years, because the conditions vary so from one year to another; and with the series of years now available, it is very difficult to approximate it. For instance, on December first of this year the ginning figure shown by line on the chart had been paralleling, and under the figure of ginning for 1905, if we had used a percentage, and only the census figures, we would have come under 1905 in our official estimate.

The CHAIRMAN. But are you not to take into consideration not only the percentage that has been ginned up to that date in previous years, but also the percentage that remains to be ginned, as shown by the reports?

Mr. CLARK. The Census Bureau does not now collect and publish during the current year a percentage remaining to be ginned in relation to the current year's crop. In its final bulletin of ginning it does so as to previous years.

The CHAIRMAN. Ought you not to take both those percentages into consideration in making your estimate of this year?

Mr. CLARK. Yes, sir; we have those available here in very excellent form in the Census Bureau reports. They give the percentage of the total crop ginned by States, and in the United States, to regular ginning dates for previous years only.

The CHAIRMAN. I gathered from what you said that you did make an estimate of this year's crops from the data you have just referred to.

Mr. CLARK. We did not make an estimate, but the statisticians have studied such data, but not for the purpose of preparing a report or estimate on it.

The CHAIRMAN. I understand they have not published anything, but they could hardly have studied it without carrying the figures out as a matter of curiosity, I should think. Do you know what results they have gotten?

Mr. CLARK. Well, I think such comparisons would indicate about 11,550,000 bales; that is, taking into consideration the lateness and delayed ginning for this year, because that must be taken into consideration. The general indications are that the crop this year was later than last year, and the ginning was being turned out later than last year or than an average year. That would affect the percentage this year as related to the percentages for previous years. All these figures here are in running bales, just as the bales come from the gin. They have averaged for a series of years higher than 500 pounds. Now the question of a difference of ten pounds to the bale in the outturn of the current year's crop will make a very material difference in the result.

The CHAIRMAN. Naturally you have to take that into consideration. You can not reduce your results to a uniform basis unless you start with a uniform standard.

Mr. HEFLIN. It is the rarest thing to find, Mr. Clark, a bale of cotton weighing over 500 pounds in my country.

Mr. CLARKE. That is in Alabama? You find it the case in Arkansas, Mississippi, and Louisiana, where the bales run heavier; also

in Texas and Oklahoma. For instance, the average gross weight of a bale in Alabama was 508.2 pounds in 1906, according to the census bulletin No. 76, which I have here. In Arkansas the weight was 526 pounds on the average.

Mr. HEFLIN. That is the average weight?

Mr. CLARK. Yes, sir, of the running bale, right from the ginnery. In Mississippi 515.8 pounds was the average, Louisiana 517, and in Texas 526.5 pounds. On the Atlantic coast the bales run lighter, and under 500 pounds. In North Carolina they were on an average 474.3 pounds; in South Carolina the average was 480.4 pounds, and in Georgia 487.5 pounds. Upon being totaled and applied to the whole country, they make 510.9 pounds for an average of the whole country.

Mr. LEVER. Now getting back to what consideration you give the census figures, let me ask this question: What effect or what weight do you give the ginner's reports, the census figures, in your final determination and final estimate, if any?

Mr. CLARK. We consider them in this way: When the board meeting reaches a certain State in its consideration of the question of yield per acre, and the members of the board have had their figures assembled on the sheet for the State, there will be a discussion coming up as to what yield per acre figure to select for that State. There will be brought together for members of the board all available information on that State that will tend to elucidate the matter, and the board would have before it the census returns for a series of years, and the latest ones, showing the total production of that State, and the total outturn up to date, to assist it in arriving at the yield per acre figure for that State.

Mr. HEFLIN. I want to ask you a question, Mr. Clark: Do you receive any information from the New York or New Orleans Cotton Exchanges in making up your estimates?

Mr. CLARK. No, sir. We have no information from them before us.

Mr. HEFLIN. Do you know whether any of the agents who report to you also report to them?

Mr. CLARK. They have instructions not to give anyone any information, and therefore not to report to them or to anybody else but the Department.

Mr. HEFLIN. Nobody else but the Government?

Mr. CLARK. Nobody else but the Government.

Mr. STANLEY. Is there any penalty attaching to the violation of those instructions?

Mr. CLARK. Under a specific law there is not; no, sir. If there was a serious violation of any instructions, of course the Secretary would invoke his power of dismissal.

Mr. HAUGEN. Your estimate for this year is then practically the same as those of the Cotton Exchanges of Memphis and New York, only differing by a couple of hundred thousand bales, is it not?

Mr. CLARK. I wish to make it clear that those exchanges did not make officially any estimate and publish it as their report. Each year the individual members of these boards prepare guesses or estimates, and some one compiles them and makes an average, and they are published by the press as commercial estimates.

Mr. HAUGEN. How are their estimates arrived at by those exchanges?

Mr. CLARK. It is simply a guess, I suppose, by individual members of the exchanges. That is, it is so stated in the public press, and that is the only information I have.

Mr. HEFLIN. And if a majority of the members of the exchange are on the "bear" side, they can issue a report that the crop will be overwhelmingly large, can they not?

Mr. CLARK. Surely, sir. There are some other commercial estimates prepared by recognized commercial estimators in the country that were issued previous to our reports. The New Orleans Times-Democrat has issued reports for some years, and it is generally recognized as a very excellent agency. Their report published December 2 estimated 11,625,000 bales. Then there is Miss Giles, of New York, who is a private estimator, and she estimated on September 4 12,581,000. Then Mr. Theodore H. Price, of New York, estimated on October 2 13,533,000 bales. There is also Mr. A. J. Buston, of Liverpool, who estimated October 31 12,000,000 bales.

Mr. HEFLIN. Do you remember two weeks before Mr. Price gave out his report of 13,000,000 and some odd bales he stated that the crop would be about 11,000,000 bales, for some purpose of speculation? Then before the ink got dry he issued his statement of 13,000,000 bales.

The CHAIRMAN. That shows the necessity for the bureau.

Mr. HAUGEN. The conclusion that arises in my mind is that if these guess estimates are about as accurate as the Department's, which are collected and made at a cost of about \$220,000, we might as well take the guess estimates.

Mr. CLARK. I should like to state right here the fact that these commercial estimates are based upon the Government reports that have preceded them for the same year and preceding years, and are practically a guess based upon the Government's reports on condition and the acreage report prepared in the spring. Before the Government reports were raised to the standard that they have attained during the past several years the cotton producer and the farmer and the manufacturer were at the mercy of the private estimator, who represented in a great number of cases the large interests purchasing our cotton for shipment abroad and the speculators. The fact that about two-thirds of the cotton crop is shipped abroad, to the value of nearly \$400,000,000 a year, is sufficient to show that it was a very important check on these private estimates. Many of them made against the interest of the cotton planter—the raising and perfecting of this crop-report agency.

Mr. LEVER. Is it not a fact, Mr. Clark, that the commercial world accepts your report as reasonably accurate, and that the market accommodates itself to your reports?

Mr. CLARK. Yes, sir.

Mr. LEVER. Let me ask you another question, and then I am through. How did your report for last year, 1906, compare with the official ginners' report as finally published?

Mr. CLARK. Our report for 1906 was 12,546,000 bales, and the total report, as you see here [indicating on chart] is approximately 13,000,000 bales. It was about half a million bales too low.

Mr. LEVER. What per cent was that?

Mr. CLARK. That was about 5 per cent. The difficulty there was on account of the abnormal conditions that existed the last of the

year. The crop was late in 1906, compared with all previous recent years, and the ginning was apparently pushed forward to the end, and there was an unexpected and unusual increase in ginning from January 16 to March 1. You see it was even larger than in 1904, in which year there was a crop larger than in 1906.

Mr. LEVER. In a period of ten years I guess that is about the biggest miss you have ever had—5 per cent?

Mr. CLARK. Yes, sir. And the peculiar thing is that the Government's report was universally accepted at the time as being quite near the facts. That was on account of the very unexpected ginning movement that was attained in the six weeks of the ginning season.

Mr. STANLEY. How long have you been making this report?

Mr. CLARK. We have been making in the Department since 1866, a general crop report, including cotton reports.

The CHAIRMAN. Suppose, Mr. Clark, you give a statement showing the estimates for the past ten years on the cotton crop, as compared with the crop reported by the Census Bureau.

Mr. CLARK. Very well, sir. I shall give this information for the years 1899 to 1906, inclusive, during which time there have been reports by the Census Bureau showing the amount of cotton ginned each year. A comparison between the annual estimates of the cotton crop by the Bureau of Statistics of the Department of Agriculture (in pounds of lint, excluding linters) and the crop subsequently reported ginned by the Census Bureau shows that the estimate of the Bureau of Statistics was under that of the Census Bureau for 1899, 3.1 per cent; 1901, 0.5 per cent; 1904, 4.2 per cent; 1905, 3.5 per cent; 1906, 5.5 per cent, and the reports of the Bureau of Statistics exceeded the Census Bureau's reports 0.2 per cent for 1900, 0.4 per cent for 1902, and 3.9 per cent for 1903.

The CHAIRMAN. I would like to ask the reason for the insertion of the new language, in the paragraph on page 39, of your estimates. Does not the present language allow you to employ local and special agents, clerks, assistants, and other labor required in making investigations in the city of Washington and elsewhere?

Mr. CLARK. We have been employing them for several years, the special agents and experts and labor in Washington; but the general wording of the bill as drawn now and for the past several years is possibly not specific and comprehensive enough to embrace that.

The CHAIRMAN. Was this change made at the suggestion of the Comptroller—do you know?

Mr. CLARK. It was made at the suggestion of the disbursing officer at a conference with him, to make it similar to the lump sum appropriations of the other bureaus of the Department. For some reason in the Bureau of Statistics this same wording was not incorporated a number of years ago.

The CHAIRMAN. I presume the same explanation would apply to the other new words which follow in the same sentence?

Mr. CLARK. Yes, sir.

The CHAIRMAN. Then passing down to the note, I see an increase is estimated for, to cover the necessities of the Bureau, "due to the large increase in the scope of this work." In what way has the scope of your work increased, or by the authority of what law?

Mr. CLARK. The scope of the work is increased in three ways. I do not know that the word "scope" would fully explain the real

meaning intended to be conveyed. The Secretary had particularly in mind, in the submission of those estimates, the scope of the field force of the bureau. In the past four years there has been an increase in the appropriation for the Bureau of Statistics, and most of that increase has been applied to extending the field service of the bureau, resulting in very much better service and a big improvement in the reports from our field agents. Since that time, instead of having one field man covering the entire cotton-producing section, we have increased it to six, and where formerly we had one field man covering this group of States, of Ohio, Indiana, Illinois, Kentucky, Michigan, Iowa, Missouri, and Kansas, we have now assigned the adjoining States of Iowa, Nebraska, and Wisconsin to another agent, and have placed an additional agent in the States of Kansas and Missouri. The idea is that it is desired to enlarge the field service somewhat by the appointment of two new agents, cutting down the enormous territory of the man who has the Northwest States, and also the large territory of the man who now has Nebraska, Iowa, and Wisconsin, and making a new territory for a field man covering the States of Minnesota and Wisconsin. Likewise, it would be an improvement to decrease the territory of the field man covering the enormous agricultural States of Ohio, Illinois, Michigan, Indiana, and Kentucky, by cutting off the State of Kentucky and joining it to the State of Tennessee and having a man there in that very important tobacco-producing section.

Mr. STANLEY. Right at that place, allow me to say that the soil of Tennessee is more homogeneous with that of the Northern States than with that of the Southern States. Is it not?

Mr. CLARK. Yes, for raising tobacco; and it also has a large corn producing capacity.

Mr. STANLEY. Would it seriously affect the autonomy of your system in putting in an additional man there, to put in a man whose purpose would be to investigate the tobacco conditions, giving him the right to follow that type into any State in which it was raised, not confining him by arbitrary lines?

Mr. CLARK. We now have a man located in Kentucky and Tennessee for just that purpose.

Mr. STANLEY. Who is he?

Mr. CLARK. Mr. J. P. Killebrew.

Mr. STANLEY. He is to investigate the amount of tobacco raised and report as to the type?

Mr. CLARK. He is now studying that question, that is, as to the available means of approximating the reports by types as well as by States.

Mr. STANLEY. He is one of those men?

Mr. CLARK. He does not cover all other crops. He is to cover all the tobacco sections of the country, and can not devote his time to other crops, such as cotton, wheat, oats, corn, and live stock.

The CHAIRMAN. Then you want two more field agents?

Mr. CLARK. Yes, sir.

The CHAIRMAN. That would account for about \$10,000?

Mr. CLARK. Not quite that.

The CHAIRMAN. Are there any other changes in your field service that you would like to speak of?

Mr. CLARK. Some part of the enlarged appropriation would be devoted to what we consider an enlargement of the scope by permitting more travel to be done by the State agents, and to insist upon their traveling, selecting State agents who could travel, whose other employment would give them an opportunity to travel more in the spring and fall. We find their reports are improved more and more by that added travel. From the current appropriation we have been able to allot only about \$5,000 for purposes of travel for such State men. We would probably use from \$3,000 to \$5,000 more, if we could have that much added to our appropriation, to enlarge the opportunity for these men to travel.

The CHAIRMAN. Can you give to the committee in a few moments a summary of what you do under the paragraph authorizing you to make investigations as to the possibility of extending the demands of foreign markets, etc.?

Mr. CLARK. We have in our bureau a division which was formerly an independent division of the Department, of which Mr. Frank H. Hitchcock was chief. Since he went to the Department of Commerce and Labor and the Post-Office Department this division has been attached to our bureau.

The division of foreign markets has for its object the extension of the agricultural export trade of the United States. The organization of the division was prompted by the need of wider foreign markets, resulting from an extraordinarily rapid development of domestic agriculture.

The conditions of demand and supply in foreign countries are studied, and for this purpose the official statistics of production, importation, and exportation published by the various governments are used. These statistics are supplemented by further details obtained from reports of consular officers, from trade journals, and from various other sources of information. The official customs returns of the United States, so far as they relate to agricultural products, are also carefully examined, classified, and analyzed. Instances of increase or decrease are particularly studied to ascertain the causes of such movements with a view to suggesting means for further stimulating the trade or for removing obstacles that retard its natural growth. In cases of special importance, where printed returns and correspondence prove inadequate, a representative of the office is sent to obtain by personal investigation the information needed.

The many inquiries received regarding our foreign trade necessitate a large correspondence, which, however, has been greatly facilitated by the policy of incorporating in printed reports the information of most general interest.

Of the reports of the office, four are now issued as regular annual series. The first gives the value and, wherever practicable, the quantity of the various agricultural products imported into and exported from the United States during the last two years, but without detail as to countries of source or destination. That publication is followed by three fuller reports, one showing the various sources of each agricultural import, another the distribution of each agricultural export, and the last relating to the trade with the noncontiguous possessions of the United States, each covering a period of three years. Sum-

mary tables in these reports give the total agricultural imports and the total agricultural exports of the United States with the several foreign countries and with our insular dependencies. The three bulletins together constitute a complete statistical exhibit of the agricultural import and export trade of this country.

Work has recently been begun on a new series of reports covering in the fullest possible manner the agricultural import trade of each of the leading European countries. As a means of indicating the lines of trade that afford the most promising opportunities for development, detailed statistics are given as to the proportion of the various imports contributed by the United States and by its commercial rivals.

From time to time special studies are made of particular agricultural products, for the sale of which there is keen and complicated international competition. Attention is devoted to the facilities for transporting agricultural products from this country, the various lines of steamships, ocean freight rates, and facilities for refrigerating. Among other subjects within the scope of the work of this division are the prices of agricultural products, domestic and imported, in prominent foreign countries and a study of successful export trade in certain agricultural products of other countries. This division possesses a very large subject-index of references to articles in an immense number of current publications, domestic and foreign. These articles are of every imaginable sort and bear exclusively upon the exportation of agricultural products, actual and potential.

The CHAIRMAN. Is not that work practically covered by the division of foreign markets in the Department of Commerce and Labor?

Mr. CLARK. No, sir. It is not a duplication of their work. The Bureau of Statistics of the Department of Commerce and Labor collects through the customs officers a detailed report of the imports and exports and publishes them in their monthly summary of commerce and finance. Those figures are used by our bureau, but only as one of the methods of advertising the feasibility of foreign markets for our goods. We also have an agent located in London, England, a special European agent, to report the conditions that may exist there; the opportunities that there may be for the business men of this country to extend their markets to certain parts of Europe. He has a commission to travel throughout Europe and work along that line.

Mr. STANLEY. Does he report from time to time?

Mr. CLARK. Yes, sir; and he prepares bulletins bearing on different subjects.

The CHAIRMAN. Who is that man?

Mr. CLARK. The man at present there is Frank R. Rutter, who was formerly assistant chief of the division of foreign markets here, and he has recently prepared a very excellent bulletin as one part of his work—Cereal production of Europe and European grain trade.

The CHAIRMAN. How much is he paid, and how is he paid?

Mr. CLARK. He is paid \$2,300 salary, and he is allowed traveling expenses during his actual travel outside of his official station, which is London.

The CHAIRMAN. Do you know how much that allowance amounts to?

Mr. CLARK. Not to exceed \$600 a year.

Mr. HEFLIN. That is outside the salary?

Mr. CLARK. Yes, sir.

Mr. HEFLIN. Making it about \$2,900?

Mr. CLARK. Yes, sir.

The CHAIRMAN. Then who draws the \$2,000 which makes up the remainder of that appropriation?

Mr. CLARK. That goes to defray the expense of clerks and special agents and the office administration here in Washington, of that division of our bureau.

The CHAIRMAN. What has Mr. Rutter done this year?

Mr. CLARK. He has prepared, in addition to the bulletins referred to, a monthly letter for the Crop Reporter, a very excellent one, which is very generally quoted throughout this country, on the subject of European crop conditions from time to time. He makes a summary covering about two or three columns, which is published in the Crop Reporter, giving the latest information as to crop conditions and prospects and yields in the different foreign countries.

The CHAIRMAN. Do you get data in your Department from which such summaries could be made up here in Washington?

Mr. CLARK. We do in part; yes, sir. Formerly, before we located an agent there, it was done here, but not with the facility and comprehensiveness that it is done in London.

Mr. LAMB. I see, Mr. Clark, on page 38 of the estimates, down near the bottom, you have these items: "Ten clerks at \$720 each," and "Six clerks at \$600 each." I want to ask what is the difference in the character of the work done by these respective clerks.

Mr. CLARK. That designation of clerks at those salaries arose by the transfer of all clerks to the statutory roll by Congress two years ago. Previous to that time the clerks were carried in part on the statutory roll and in part on the lump-fund roll, and quite a number were employed as special laborers at \$50 and \$60 a month outside of the civil service regulations.

The Executive Order against continuing the appointment of such employees, which was published about three years ago, prohibited the later appointment of them, and about two years ago Congress classified them and "blanketed" them in as part of the regular official force of the Department. Many of them were very excellent clerks and have been promoted to higher grades; but as they were placed on the statutory roll these positions also were provided for and became fixed at those salaries and so secured at the bottom of the roll a number of positions at \$600 and \$720 a year. It has been a drawback to our clerical force or personnel in this way. As vacancies occur from resignations, deaths, etc., as quite a number have, it is the policy to promote the deserving clerks within the bureau to the higher positions, and to fill the lowest positions by certification from the Civil Service Commission. To request the certification of a clerk at \$600 a year in Washington City is unsatisfactory, because we are not able to get as high-grade employees as we wish and need; and we now have about 10 to 15 of such positions. The Secretary is appreciative of that view, and he originally approved a recommendation which I made this year to have all these lowest salaries placed at a more

reasonable figure. But at that time the matter of reclassifying the clerks throughout the different Departments came up, and he said he would await the result of Congressional action toward this reclassification.

Mr. LAMB. Is it a fact that these \$720 clerks do no better work than the \$600 clerks?

Mr. CLARK. A great many of these \$600 and \$720 clerks do a high grade of work. They do a character of work that is deserving of \$1,000 per annum in some cases; but we are unable to advance them on account of the positions being specific and statutory.

Mr. LAMB. I believe if the \$600 clerk does as much work as the \$720 clerk there would be great dissatisfaction and complaint.

Mr. CLARK. There is a feeling that there is not an equitable adjustment of salaries, and there is not; and I think the Secretary appreciates that and wishes to remedy it.

The CHAIRMAN. Just very briefly I wish you would tell us why you have transferred one editorial assistant from the statutory roll to the lump fund appropriation.

Mr. CLARK. We have had an editorial assistant for some time; Mr. Rutter holds that position today at \$2,300, and he is designated as the special agent in London. The Secretary thinks it would be more consistent to have him appointed as a special agent over there in London, and to do away with the position of editorial assistant, as we have a chief of editorial division who can handle that work now.

The CHAIRMAN. You will note here that one clerk at \$1,000 is transferred to the Secretary's roll. Does that mean you have more clerks than you need?

Mr. CLARK. No, sir. That means we have been carrying a \$1,000 clerk for a couple of years for the Secretary. He has needed additional help in the appointment office or in the division of supplies, or one of the offices connected with the Secretary's office, and we have let them have the use of such a clerk who has been carried on our rolls. We have been able to get along without his services in the last two years, and now I understand there is some other provision in the appropriation act for the carrying of that man on the Secretary's roll, and so we discontinue carrying him on our roll and discontinue the \$1,000 in the estimate.

FRIDAY, January 31, 1908.

The committee met at 10 o'clock a. m., Hon. Charles F. Scott (chairman) in the chair.

The CHAIRMAN. Gentlemen, in the regular order of procedure we would have considered this morning the Bureau of Biological Survey, but Mr. Hawley, of Oregon, is rather peculiarly interested in the Office of Experiment Stations, and he is obliged to leave the city to-night to be gone for some time, and at his request, as you will remember, the committee agreed that this morning we would take up the estimates for the Office of Experiment Stations. Doctor True, the director of the Office, is present, together with some of his associates in the work, and we will ask him to give us some information.

**STATEMENT OF MR. A. C. TRUE, DIRECTOR OF THE OFFICE OF
EXPERIMENT STATIONS OF THE DEPARTMENT OF AGRICULTURE.**

The CHAIRMAN. Doctor True, before taking up your work in a general way, I believe I will ask you to go over it with us with a view to noticing the changes that are noted in your estimates.

First, on page 22 I notice you recommend an increase of one clerk of class 2 and an increase of two clerks at \$1,000 each, a total increase of three clerks for your statutory roll. Let me ask whether that increase would be necessary in case your appropriation remains the same as it was last year, or whether that increase is only estimated for with the expectation of the added work that would follow an increase of your appropriation bill.

Mr. TRUE. There is here no actual increase in the number of persons. We have just as many persons in the office now as there would be if this increase was added, but it grows out of transfers from the lump sum.

The CHAIRMAN. These are, then, merely transfers from the lump sum?

Mr. TRUE. Yes.

The CHAIRMAN. And the persons referred to are already employed in the office?

Mr. TRUE. Already employed in the office.

The CHAIRMAN. Does the transfer involve an increase in salary?

Mr. TRUE. Yes, it involves a small increase in salary in the cases of the three persons referred to.

The CHAIRMAN. What are they getting now? Take the first one referred to.

Mr. TRUE. The first one is getting a salary of \$1,200. The other two are each getting a salary of \$900.

The CHAIRMAN. And the transfer would give the first one a salary of \$1,400 instead of \$1,200?

Mr. TRUE. Yes, sir.

The CHAIRMAN. And the change as regards the other two would increase their salary \$100 each?

Mr. TRUE. Yes, the change as regards the other two would increase their salary \$100 each.

The CHAIRMAN. And the transfer is made chiefly for the purpose of getting the increases?

Mr. TRUE. No, sir; the transfer is made under the provision of law which requires us to transfer clerks from the lump sum to the statutory roll at the end of the year.

The CHAIRMAN. I remember that, now. All three of these clerks have been employed less than a year?

Mr. TRUE. I should further explain that in making these promotions it is our intention to promote persons who have been longest in the service and who are most deserving. The situation, then, more exactly, perhaps, is this: Under the law we have to transfer three persons from the lump sum roll to the statutory roll, and in connection with that, we are asking for the promotion of three of our clerks, choosing those who are most worthy of promotion.

The CHAIRMAN. And not necessarily the ones who have come in from the lump-sum roll?

Mr. TRUE. No, sir. That is the plan we have always followed.

The CHAIRMAN. So, as a matter of fact, what salary will these particular individuals receive when they go on the statutory roll?

Mr. TRUE. My recollection is that the persons we are transferring have been employed at \$840, and they would remain for the present at that salary, for the next year.

The CHAIRMAN. Passing now to the paragraph covering your general expenses, I notice an increase of \$19,995 submitted in your provision for carrying out the act of 1887. Is that in accordance with the law which increases year by year the appropriations under the Adams Act?

Mr. TRUE. No, sir; the appropriation involved in this item is simply for the stations under the Hatch Act, and that remains constant from year to year and amounts to \$720,000. But the total sum there includes other items relating to the work of the Office of Experiment Stations, so that the increase of \$19,000 is the total increase, the items of which are set forth later on in the bill.

The CHAIRMAN. Then the increase of \$19,000 is all called for by the work of enforcing the execution of the Hatch Act?

Mr. TRUE. No, sir; by different items included in this long paragraph here which I can explain as they come along. For instance, right under that you find an increase of \$3,995. That is a part of the \$19,000.

Mr. POLLARD. Is this \$19,000 added to the amount carried in the Hatch fund, \$720,000?

Mr. TRUE. No, sir; the Hatch fund is constant.

Mr. POLLARD. I understand that, but is this item of \$19,000 added to the \$720,000?

Mr. TRUE. No, sir.

Mr. POLLARD. Maybe you do not understand my question. Is this \$19,000 used for the same purposes for which the Hatch Act fund is used?

Mr. TRUE. No, sir; the \$19,000 is an addition to the appropriation to be used by the Office of Experiment Stations. Out of this \$995,000 the stations will get \$720,000, under the Hatch Act, the rest of it is an appropriation for the use of the Office of Experiment Stations.

Mr. POLLARD. Here in Washington?

Mr. TRUE. Yes; the whole increase is an increase for the Office, and is divided into a number of items which I will explain further on in the paragraph.

Mr. POLLARD. Will you just proceed then to call our attention to it?

Mr. TRUE. The first of those immediately under this total is \$33,995, an increase of \$3,995. This is to enable the Office to carry out the provisions of the acts of Congress of 1887 and 1906, that is, of the Hatch act and of the Adams act, as regards the supervision of the experiment stations. That money is used for what we call the general business of the Office of Experiment Stations, and that includes whatever we do in supervising the expenditure of the Federal funds which are given to the experiment stations through the country, and the preparation of publications based on the publications of the experiment stations, and the carrying on of a large correspond-

ence and miscellaneous duties which are involved in our relations with the experiment stations of the country. Under that head we are asking for this increase of \$3,995, and that is for the special purpose of increasing the work which we do in connection with our publications, especially our serial publications known as the Experiment Station Record and The Experiment Station Work. The Experiment Station Record is a monthly journal which contains abstracts of the publications of the Department of Agriculture, the agricultural experiment stations in the United States, and the stations and kindred institutions throughout the world. In connection with that we handle a very large amount of literature, and that literature is increasing with the growth of agricultural institutions, and with our present limitation of funds we are not doing what we ought to do in that direction. We are obliged under present conditions to keep our work in such condition that material is accumulating which we are unable to publish, and to make our abstracts, especially those of the foreign literature, so short that they are not satisfactory to our constituency.

Mr. POLLARD. Are these reports intended for the agricultural stations that you are speaking of?

Mr. TRUE. These reports are primarily intended for the investigators in the Department of Agriculture and the agricultural experiment stations.

Mr. POLLARD. They are more or less technical, then, in their nature?

Mr. TRUE. Yes, we intend to make them technical. We make no effort to make them popular, and we do not distribute them to individuals outside of these institutions, to any extent. The bulk of the edition is sent to the scientific officers of the Department of Agriculture and the workers in our experiment stations. We also have a considerable exchange list with foreign institutions from which we receive publications, of which we put abstracts into this journal. Then there are the teachers in the agricultural colleges and agricultural schools, and a limited list of scientists who are working along related lines. They are also furnished, of course, to a considerable number of libraries.

We have received in recent years a good many complaints, if you may call them such, from our immediate constituency—that is, people in the Department and in the experiment stations—because we are not able to give a more complete review of the foreign literature. We get now in the Department of Agriculture in the course of a year something like 800 publications of the Department and of our American experiment stations, and we abstract those. We get such publications as are issued by more than 1,000 agricultural experiment stations in over 50 countries of the world. Then there are coming to the Department regularly some 1,600 periodicals containing reports of agricultural investigations and other investigations relating more or less directly to agriculture. We handled last year in the office over 17,000 numbers of such publications. These are in 10 or 12 different languages, and this literature is constantly increasing. In many lines of agricultural research there is growing activity, and our work constantly grows, therefore, on this journal. We have reached a point where if we are to do the work as I think it ought to be done and as

our constituency, if I may use that word, desire that it should be done, we ought to have some increase in the force which is engaged on that work.

In connection with that we are also preparing what may be called a popular record of the practical results obtained by the experiment stations. This is put in the series of Farmers' Bulletins, under the general title of "Experiment station work." You are doubtless familiar with the lists of farmers' bulletins which are issued through our Division of Publications, and will remember that this term "Experiment station work" occurs quite frequently in that list. The general index to the Farmers' Bulletins contains hundreds of references to articles in Experiment Station Work. At present we are issuing this every other month. But there is a considerable amount of material which would be useful to put into such a publication which we are not bringing out at present.

Mr. POLLARD. I understand that that is a review of investigations that have been carried to a successful issue, and it is thought by your office that they would be of general interest to the farmers and people of the country?

Mr. TRUE. Yes, sir.

Mr. POLLARD. And in this report you cover not one particular subject, but a number of subjects?

Mr. TRUE. Yes, usually from 10 to 12 different subjects in each number.

Mr. POLLARD. Are you able in a short bulletin to discuss a project in such a way as to make it clear to an individual, a person that is not familiar with the subject?

Mr. TRUE. I think so. We try there to get the results and put them in such language that the farmer, the intelligent farmer, will understand. That is the object of it.

Mr. POLLARD. But you do not go into detail?

Mr. TRUE. No, we do not go into detail.

Mr. POLLARD. I would like to ask you whether what you might call a practical expert could not take up that subject and issue one bulletin on each subject, confining it in one project, and being able to go into details to a greater extent than you could, whether he could not make it more clear and effective than by trying to cover eight or ten or a dozen projects in one bulletin that would necessarily have to be brief on each one?

Mr. TRUE. It is possible that that might be done, but that would involve a much larger amount of work. This bulletin as we prepare it is prepared by the same men who prepare the Experiment Station Record. They are traversing all the literature of these subjects and they are, as a rule, men who have had some practical experience in agriculture, as well as scientific training. They are able, if they have the time, to bring out not only what is reported in particular station publications, but any sidelights on that subject which may have occurred in other literature.

Mr. POLLARD. The reason I asked the question was this. It occurred to me that on account of the lack of space where you cover a number of projects the bulletin that has a treatise on each item would necessarily be so brief that it would also necessarily be more or less technical, and the average farmer would not be able to comprehend it and get the real good out of it.

Mr. TRUE. I hardly think that is so. The station publications as a rule, or very many of them at least, contain a great many details which the farmer does not need to have. They are reports on investigations given in more or less detail. We try to take out of those and put in a clear way the practical results, giving enough to show what the nature of the experiment was and what its result was as bearing on practical agriculture.

Mr. POLLARD. It has always been a question in my mind whether there was very much good derived from the publication of these bulletins at all, that is, where they are distributed broadcast. We have been having hearings on this department now for almost two weeks, and in almost every instance we find that bureaus are doing demonstration work, and we are advancing to the belief that the bulletins are not doing the work. There are 6,000,000 or 8,000,000 distributed every year, and yet it is found necessary to supplement that by demonstration work, in order to carry the information in the bulletins to the people. I was wondering what the cause was, and whether this might not be one of them.

Mr. TRUE. My view of that is this, that in order to get the best results both things must be done. The bulletins of the experiment stations and the Department of Agriculture reach a large number of people. The chief means of getting information to the farmers regarding the work of the Department and the stations thus far has been printed matter. There is no doubt in my mind that the work of these institutions has strongly influenced our agriculture. It has done it, however, so far mainly through reaching directly a limited number of the more intelligent men engaged in agriculture, and then through them, by their influence and example, it is spread out to a wider circle. We have not, however, yet succeeded in reaching the masses of our farmers, and I think in order to do that we will have to go to them with oral instructions and with demonstration work, in addition to the printed matter.

The CHAIRMAN. Will you summarize, in two sentences, the field estimated to be covered by your publication called "The Experiment Station Work," and the other one that you call "The Experiment Station Record," and the people to whom those publications go?

Mr. TRUE. The Experiment Station Record is a technical and scientific summary of the publications of experiment stations and departments of agriculture in the United States and throughout the world. The Experiment Station Work is a popular summary of the results of experiment station work in this country and, to a limited extent, abroad.

The CHAIRMAN. The Experiment Station Record, therefore, goes only to technical students of agriculture?

Mr. TRUE. Yes.

The CHAIRMAN. And to what extent do you attempt to give general circulation to your Experiment Station Work?

Mr. TRUE. The Experiment Station Work is published in the Farmers' Bulletin series and is therefore very widely distributed.

The CHAIRMAN. And it attempts to take the bulletins that are published by the various experiment stations and make their substance understandable to the ordinary farmer?

Mr. TRUE. Yes, sir.

The CHAIRMAN. If the bulletins of the experiment stations were published in the right form and distributed in the right way, would the publication of your Experiment Station Work be necessary at all?

Mr. TRUE. I think so, unless the Hatch act were changed and the expense of publication of the experiment station bulletins of the several States was greatly increased. One difficulty which the experiment stations in the separate States have now is that so many people outside their own States inquire for their bulletins that they are embarrassed to send them, not having funds to print with and not feeling that under the law they ought to extend their distribution.

Mr. POLLARD. Are these bulletins that are prepared by the State stations published out of the Hatch fund?

Mr. TRUE. In some cases they are and in other cases they are not. A good many of the States have made State appropriations to cover in whole or in part the publication work of the stations.

The CHAIRMAN. I will direct your attention to the italics on page 43, setting out that "the money received from such sales to be deposited in the Treasury of the United States as miscellaneous receipts." That is simply to conform with the general policy of the Department to turn over all money which is received in the course of its operations to the Treasury.

Mr. TRUE. Yes, sir.

The CHAIRMAN. And afterwards to have that money appropriated out instead of using it as a revolving fund?

Mr. TRUE. Yes, sir.

The CHAIRMAN. Of course, that is all right. Further down in the paragraph I notice an increase of \$11,000 submitted for the Agricultural experiment stations of Alaska, Hawaii, Porto Rico, and Guam. So far as the first three are concerned, I presume that merely gives them the appropriation to which they would be entitled under recent acts of Congress?

Mr. TRUE. Yes, sir.

The CHAIRMAN. But it is a new appropriation, so far as the Island of Guam is concerned?

Mr. TRUE. Yes, sir.

The CHAIRMAN. You have not been doing any work along that line in this island?

Mr. TRUE. No, sir.

The CHAIRMAN. Have there been any new explorations in that island by this department which would indicate the necessity or the value of such work there?

Mr. TRUE. I do not know that there has been any definite exploration.

The CHAIRMAN. Then may I inquire how you know whether it would be worth while to establish the work there or not.

Mr. TRUE. This matter has come to us through the Navy Department, which is in charge of affairs in the island of Guam.

Mr. COCKS. I think it has been formally transferred to the Interior Department, but still is in charge of the navy men holding over.

Mr. TRUE. Practically they have been in charge. Now, as I understand it, there is on that island a population of 10,000 or 12,000 people chiefly dependent on what they can get from the soil for their support, and the officers of the Navy who have been there have been so

impressed by the need of developing agriculture there that they have themselves undertaken to institute some experimental work, but feeling that that was out of their line they have appealed to the Secretary of Agriculture to undertake operations there in a regular way, and he has made this estimate for that purpose.

The CHAIRMAN. Do you know what the character of their agriculture is at present?

Mr. TRUE. It is of the simplest kind.

The CHAIRMAN. Do they try to plow and plant and harvest, or do they simply gather from the spontaneous growth of the island?

Mr. TRUE. Both things are done, and there is some cultivation of the soil, but it is of the simplest, rudest kind.

The CHAIRMAN. What do they raise there; do you know a thing about it, as to their agricultural possibilities or prospects?

Mr. TRUE. I have no definite official information. I think perhaps our Doctor Evans, who is here, can give some further general information.

The CHAIRMAN. We will pass that, then, for the present.

Mr. COCKS. Right in that connection I would like to say that I have visited the island of Guam this last summer, and I think there is need of help there, and the present governor has done a great deal to encourage the introduction of agriculture. We hardly know what the possibilities are. I saw a good many vegetables growing, and there are a good many fruits growing, of course in a small way. It is under the Navy Department, and he has a department of agriculture of his own. There are about 10,000 inhabitants. The principal export of the island is copra now, but the possibilities of increasing the agriculture of the island are as great as in any part of the Philippines, I think. I would be in favor of helping them along, because they are entirely dependent upon the exports of this character.

The CHAIRMAN. Do you know about what proportion of the 210 square miles which the island comprises is tillable?

Mr. COCKS. I should say there was not over 15 per cent. I only went from the little seaport up to the capital and looked over the rest of it, and that is a very rough estimate. They have a disease of the cocoanut, as they have discovered, which he fears will prove very disastrous. That is the main supply of those people now, and he was very much interested in this cocoanut disease that he had discovered there, a disease of the cocoanut tree.

Mr. POLLARD. I would like to inquire why the appropriation is so large. I understand there are only 10,000 or 12,000 people there, and you are asking for \$5,000.

Mr. COCKS. There is nothing there.

Mr. TRUE. There is nothing there with which to begin an experimental station.

Mr. POLLARD. Part of this goes for the construction of buildings?

Mr. COCKS. Of course.

Mr. TRUE. We would have to employ an agent and send him out there and make an investigation and undertake operations there, and that is a very modest sum to ask for any kind of a station.

The CHAIRMAN. Proceeding further in this paragraph, I notice a provision that money obtained from the sale of products at the stations in Alaska, Hawaii, Porto Rico, and Guam shall be applied for

the maintenance of these stations. Do you know how much money has been obtained from these sources during the past year at the stations in Alaska, Hawaii and Porto Rico?

Mr. TRUE. I do not have in mind the exact sum, but the total amounts to several thousand dollars.

The CHAIRMAN. Would it not be good administration to return this money into the Treasury as general receipts, just as you provide above in the case of sale of card indexes and things of that kind? When you turn it over this way and make a revolving fund of it, it practically adds to the amount appropriated by Congress for the support of these stations.

Mr. TRUE. This arrangement, however, is in accordance with the general plan in our experiment stations in the United States. The stations receiving the Federal funds under the Hatch and Adams acts through the use of those funds get a certain amount of materials that they sell, and that sales fund is devoted to experimental purposes, and we thought it was only fair that the stations of Alaska, Hawaii and Porto Rico, should have the same opportunity.

Mr. POLLARD. Is that the money that is derived from the sale of crops that they grow on the experiment station farms?

Mr. TRUE. From the sale of crops, or animals that they may have.

The CHAIRMAN. What is the particular demand for the increase of \$5,000 submitted in the sum "to investigate and report upon the organization and progress of farmers' institutes," etc.?

Mr. TRUE. The object there is to increase the work of the office relating to agricultural education.

The CHAIRMAN. In what way?

Mr. TRUE. By doing more with reference to the interests of our agricultural colleges, our agricultural schools and farmers' institutes, and to aid more generally than we are able to do now the great movement that is going on throughout the country for the promotion of agricultural education in our public school system.

The CHAIRMAN. In what way are you called upon to aid the promotion of agricultural education in the public schools?

Mr. TRUE. We are called upon to do that in the first place through our association with the agricultural colleges and the experiment stations, especially as represented in their general association. The movement for wider diffusion of agricultural education is comparatively a new movement, and there has been great uncertainty as to what ought to be done along this line, or in fact whether anything effective could be done. The agricultural colleges and experiment stations are looked to as the sources of agricultural knowledge, along with the Department of Agriculture, in this country, and so they have been called upon to aid this movement by working out definite plans for such instruction in connection with our public schools, and they have felt, and I think perhaps they have expressed to this committee already, the need of a central agency which should get together the experience of the world on this point to this time, and should formulate in some definite way plans for the operation of courses of instruction in agriculture of an elementary character.

The CHAIRMAN. Doctor True, the executive committee of the American Association of Agricultural Colleges and Experiment Stations was before this committee a few days ago, and in reply to

questions, every member of that committee stated very positively that his institution was, and he believed all the institutions of the various States were, fully prepared and perfectly qualified and competent to submit courses for agricultural education in the common schools that would fully meet the requirements of those schools. They did not intimate that they needed help from the Department in that line, at all.

Mr. TRUE. I of course was not present at the hearing, but from the action which the association took at its last meeting, and from the calls which we get from those institutions for advice and help, I had supposed that they desired we should do work along this line to a considerable extent.

The resolution adopted by the association is as follows:

Whereas there has been a large expenditure of money and energy in the acquisition of knowledge of rural affairs and in the organization of country life education in collegiate, secondary, and primary schools; also in short courses in farmers' institutes, in traveling schools, and in other forms of extension instruction; and

Whereas there is now manifest a determination on the part of the American people to rapidly multiply the agencies for extending this kind of practical education: Therefore be it

Resolved, That the Association of American Agricultural Colleges and Experiment Stations urges upon the Congress liberal appropriations to enlarge the work of the Office of Experiment Stations along the lines of investigations and publications in relation to methods of instruction in agriculture relating to the farm, to the farm home, and to rural interests generally.

Adopted at the meeting at Lansing, Mich., May 28-30, 1907.

Mr. POLLARD. Mr. Chairman, my recollection of the statement is that those courses of study were prepared both from their own knowledge and from that which was furnished by the Department at Washington.

The CHAIRMAN. I do not remember particularly as to the sources of their information, but I am very clear as to the recollection of their statement, that they were entirely able to do the work.

Mr. POLLARD. Yes, that is true.

Mr. HAWLEY. I would like to ask if this \$5,000 is to be used in doing more of the same kind of work that you are now doing, or to undertake new kinds of work?

Mr. TRUE. It would be essentially an extension of the work. That is, we have done quite a little work along various lines relating to agricultural education, but that work is in my judgment not very satisfactory, because of the limitations of our funds. If we had this additional sum I think we could do more and better work. This appropriation was given us in the first place several years ago with special reference to our work connected with the farmers' institutes. Afterwards the language of the act was changed so as to permit us to do work in connection with the agricultural schools as well, but we received no increase of appropriation, and with the growth of the demand for educational work we have been hampered in doing what we have felt necessary.

Mr. POLLARD. Has this request for information come from the agricultural schools themselves, or from the experiment stations?

Mr. TRUE. It comes from the agricultural colleges and stations, from the agricultural schools, from the State departments of agri-

culture, and from teachers, and others who are interested in the movement for agricultural education.

The CHAIRMAN. Doctor True, do you believe at this stage in our educational development it would be possible to put into the common schools of the country instruction on agriculture which would be of practical benefit?

Mr. TRUE. Yes.

The CHAIRMAN. Do you think the teachers are prepared to give that instruction?

Mr. TRUE. I think that we have reached the stage when we have a fairly definite and reasonable programme for such instruction, and I believe that such instruction can be taken up with profit in a large number of schools. That number, however, at present would be only a fraction of the total number of institutions. But there is every reason for encouragement, it seems to me, in this movement, and for pushing it along, and that is the thing that we are specially interested in. We are trying to throw the influence of the Department of Agriculture in favor of this movement for the improvement of the country schools, and I am profoundly impressed with the idea that that is a fundamental matter of the highest importance.

One great difficulty in getting farmers generally to accept and practice the results of scientific work on their behalf is that they have not been prepared by early training to receive and understand what is being done for them by these scientific institutions. Now, if we can change the atmosphere and the instruction in the country schools, so that the children as they come along will get some idea of what science may do to help the farmer, I think we shall make, within a generation, a tremendous gain. We shall have a farming population which will have as a whole a progressive attitude and outlook.

The CHAIRMAN. Without going into the detail of a complete curriculum, could you give the committee very briefly your idea of what might be profitably taught in the common schools?

Mr. TRUE. My idea is that in the lower grades of those schools the children should be taught to observe the facts in nature and in the business of agriculture, such as they may be expected to observe at that early period in life; in other words, that elementary training in, I should say, the first six grades of the school would be the training of the powers of observation and the bringing the child into touch with nature and giving him a love of observation, and showing him the brighter and more attractive side of country life. When he reaches the age of 12 years or over, that is in the seventh and eighth grades, I think he can be given profitably some definite instruction along agricultural lines, that he can be taught simple principles with reference to the operations of nature in the soil and the growth of plants and animals used in agriculture.

Mr. HAWLEY. Would you make that text book instruction, or would you have a school garden?

Mr. TRUE. I would have the school garden if possible, by all means; but I would have the text book, at least in the hands of the teacher, as a guide to this work. There should also be simple practical exercises and demonstrations, and if possible the children should be encouraged to do a little work of their own at home in the raising of

certain things, and observing what goes on in their growth. We have prepared a definite program of this kind in connection with the work of the standing committee of the Association of Colleges and Stations, of which I have the honor to be the chairman. Those publications are available, and if you have not already received them, I should be very glad to put them in your hands.

Mr. BEALL. In what numbers are they available; for each representative, say, in sufficient numbers so that he could supply the teachers throughout his district?

Mr. TRUE. We try to supply teachers so far as we can. They are published for the most part in our list of circulars. They are small publications.

Mr. McLAUGHLIN. You say you try to supply teachers. Mr. Beall asked you if they were supplied to Representatives in such numbers that he could supply the teachers in his district if he wanted to?

Mr. TRUE. They are not in the Farmers' Bulletin series.

Mr. McLAUGHLIN. I do not care in what form they are; are they printed in such form that a Representative can get them?

Mr. TRUE. Practically he can get a considerable number.

Mr. BEALL. If I could get 200 or 300 of them I would put them in the hands of every teacher in my district. We are just beginning to teach agriculture there.

Mr. TRUE. I see no reason why you could not get that many.

Mr. BEALL. Where could I get them? By application at your office?

Mr. TRUE. By application at the Office of Experiment Stations. Of course if this got to be a large matter I should say it would naturally come before the Secretary for his decision, and if the demand was very large, we might have to ask for some extension of the printing fund of the Department to meet it. But so far we have been able to meet the demands for these publications to be put in the hands of teachers.

Mr. LEVER. Do the teachers of the country generally know that you have these publications?

Mr. TRUE. I do not suppose that the teachers generally do. A considerable number of schools and teachers do; but this is a new work, and we have only a limited list to whom we send such publications.

Mr. LEVER. Are you making any special effort to put this publication in the hands of the teachers generally?

Mr. TRUE. We are calling it to the attention of the State and county school officials in the different States.

Mr. LEVER. Does there seem to be any general demand for the publication?

Mr. TRUE. There is a large demand. But this movement is a new movement; you must bear that in mind all the time. Personally, I do not think we want to go too fast. What the Chairman spoke of in regard to the training of teachers for this work is a very important consideration, and it is along that line especially that we are trying to work. It would take a considerable number of years to get the supply of teachers properly trained to do this work in the best way.

Mr. HAWLEY. Might I interrupt you to make a remark?

Mr. TRUE. Certainly.

Mr. HAWLEY. In my district the county superintendents are having county school fairs, offering prizes to the students of the differ-

ent schools and to the different schools as such, that produce the best agricultural products, and at the State fair this last year several of the county exhibits were made largely from these school products, and the county that got the first prize, Benton County, won it by the products that the school children had raised in this manner, which indicates that the school children can be interested largely in the study of agriculture and can under proper supervision produce products that are worthy of commendation.

Mr. TRUE. I do not think there is any doubt about that.

The CHAIRMAN. I believe unless some members of the committee have further questions to ask along this line, we will take up the experiment work outside of the country, and I will ask about Hawaii and Porto Rico.

Mr. TRUE. May I just sum up what I had to say about the school situation? I want the committee to understand. Practically, we are asking for an appropriation of \$10,000 to increase and to make more effective the work of the Office of Experiment Stations as a clearing house for the general movement in favor of agricultural education in this country, and that includes all the work that we have in mind to do for the agricultural colleges, the special agricultural schools, instruction in agriculture in the public schools, the farmer's institutes, and other forms of what is called extension work in favor of agriculture. I simply wanted the committee to understand that we had a comprehensive line of work relating to the different phases of agricultural education, and therefore we think that we are asking a modest sum for the performance of such duties as seem desirable in connection with agricultural education.

The CHAIRMAN. Will you now present the matter of these outside experiment stations? We would like to know as briefly as is consistent with bringing out the main points what you are accomplishing in Alaska and Hawaii and Porto Rico. Of course, if you prefer to introduce Mr. Evans, who, I think you said, had direct charge of this, we would be very glad to hear him.

Mr. TRUE. Perhaps the best way would be for me to make a very brief general statement and then for Doctor Evans to be ready to answer any questions in detail.

The stations in Alaska, Hawaii, and Porto Rico are organized on the same general plan as the State experiment stations. They are, however, entirely dependent for their support upon the appropriations made by the Federal Government through the Agricultural appropriation bill and are managed directly by the Office of Experiment Stations. The stations in each country are in charge of a special agent of the Department, who performs the functions of a director. The general business connected with them which must be transacted at Washington is done in the Office of Experiment Stations and is in immediate charge of Doctor Evans, who is here to-day, and has an intimate knowledge of the work of those stations.

In Alaska the effort is to determine the agricultural possibilities of that great territory, and to assist the people actually there who are interested in agricultural operations. We use that term "agricultural operations" in a broad sense to cover gardening as well as farming. We have in the territory already a considerable number of persons who are doing more or less in raising crops. We distribute in cooperation with the Bureau of Plant Industry, seeds in

Alaska to something like 2,500 persons. We have tried through our experiments there to determine what varieties are especially adapted to different regions, and I think have been able to greatly encourage the raising of produce there by our work. Before we undertook this work, the people who went there had no conception, usually, of what would be needed, and getting their supplies and seeds from San Francisco and other southern points, they made a great many failures. We have certainly helped them to get much greater certainty of results. In connection with that general work we are now trying specifically to encourage the development of animal industry. For that purpose we have a herd of Galloway cattle, and we are studying them with reference to their suitability for Alaskan conditions, and also the production of forage for their use. Thus far the animals have done very well, and the outlook is a hopeful one.

Mr. HAWLEY. How are your reindeer getting on up there?

Mr. TRUE. We have nothing to do with the reindeer experiments, which are conducted under the Department of the Interior. They began their work a long time before we had any experiment stations under the Department of Agriculture. The conditions in the Territory are very different in different regions, as doubtless many of you know. In the coast regions the climate is comparatively mild and a large number of different kinds of crops can be raised wherever there is land suitable for their culture. In the interior the climate is much colder, and in many regions quite dry, and therefore we have to make special investigations with reference to those regions. We have established several stations and are trying to work out problems for different parts of the Territory as well as we can. In Hawaii and Porto Rico we have tropical conditions, and there the effort is to encourage the people to diversify their agriculture and horticulture and to give especial attention to those products which are not raised in the continental United States, but which we have to import. We import now some \$200,000,000 worth of tropical products annually. A considerable amount of this material may easily be obtained within our own possessions, and the effort is to make our work contribute to the success of those possessions along those lines.

I think perhaps that is all I need say, Mr. Chairman, in a general way, and Doctor Evans might take it up there, unless you have some questions which might be directed to me especially.

The CHAIRMAN. In particular I should like to inquire what progress is being made in Porto Rico in the development of the coffee industry.

Mr. TRUE. We are engaged in experimental work along a number of different lines relating to coffee, trying to improve the culture of the different varieties grown and the methods of handling the crop, and we have had considerable success in our work there. The details of that work Doctor Evans is more familiar with than I am.

The CHAIRMAN. May I ask, then, that you let him answer that question.

Mr. TRUE. Very well.

STATEMENT OF MR. WALTER H. EVANS.

Mr. EVANS. In replying specifically to the Chairman's question as to what we are doing in regard to coffee, I would say that we have

on one of the largest coffee plantations in Porto Rico, under a co-operative agreement that is running for ten years, a tract of coffee land that has been given over to us, practically to do whatever we please with it. The only condition is that we are to give the owners half the product, whatever it is. We have taken that coffee and we have cut it out. In some places we have removed two-thirds of the trees; in others we have removed less. We have topped them and pruned them and fertilized them and cultivated them, and in that way we have demonstrated, in the three years that we have been working, the possibilities under ordinary conditions of easily more than doubling the product of the tree, using the Porto Rican variety of coffee.

Mr. HAWLEY. How large an area are you operating on?

Mr. EVANS. The coffee plantation altogether has several hundred acres, and we have control of about 50 acres. We are working regularly on 10 acres. That is divided, in this particular work that I am speaking of, into acre tracts, each tract being handled separately.

The CHAIRMAN. Do you mean that you have demonstrated that more than double the usual product can be brought from one acre, say?

Mr. EVANS. From one acre, or from an individual tree.

The CHAIRMAN. I asked that question, because you said you had cut out trees. If you cut half the trees and only doubled the original product, you really have not accomplished anything.

Mr. EVANS. We can not tell what the effect may be on this year's growth or next year's growth; it may be even more. But the acreage yield has been increased materially.

The CHAIRMAN. Under whose direction was that work done?

Mr. EVANS. That is being done under the direction, the immediate charge, of Mr. J. W. van Leenhoff, who was born in Holland and who spent about fourteen years in Java, and who has been now for about twelve or fourteen years in Porto Rico.

The CHAIRMAN. He is a trained coffee expert?

Mr. EVANS. I would consider him a coffee expert. In addition to this pruning, fertilizing, and cultivation work we have taken up the subject of the proper preparation of the coffee for planting. The old method in Porto Rico was to go out in the woods and wherever they could find a coffee tree pull it up by the roots and take it where they wanted to plant it, and then make a hole in the ground, with a crowbar, perhaps, and stick it in, with the roots all doubled up anyway. That was the Porto Rican method. The shade was dense. They seemed to think that the denser the shade the better the coffee would be. The result was that they had little spindling trees with delicate branches, and the picking of the coffee was a difficult process; and the plants were not well selected, so that in many ways we think the conditions were very adverse to the proper cultivation of the crop.

Mr. STANLEY. What effect has your investigation had on the quality of the coffee bean itself, in either its size or its flavor?

Mr. EVANS. It has increased but little in size. We do not know very much about the flavor, because the trees we are experimenting on in that respect are of the Porto Rican variety, and we do not believe that the change in cultivation is going to materially change the quality of the berry obtained.

The CHAIRMAN. What is it that principally determines the quality of the coffee?

Mr. EVANS. That is something that I do not know; I do not know that anyone does. It is probably due to a number of factors.

The CHAIRMAN. I wondered if you had conducted any experiments to determine whether Java coffee transported to Porto Rico would produce as good a quality as it does in Java?

Mr. EVANS. That is what I was just going to speak of. We are growing about 25 or 30 different varieties of coffee obtained from different places, in the seed beds, in which we are demonstrating to the Porto Ricans that it is absolutely necessary to get a good lot of trees to set out. Even the native Porto Rican who has seen our work down there, now, if he is going to plant coffee, will have his seed beds, and transplant from them into the nursery, and then into his plantation. We are doing that not only with the Porto Rican varieties, but with 30 other varieties that have been obtained from different parts of the world, and last year from the 3-year-old trees, some of them nearly 4 years old, we got a few ounces of coffee. That was sent to me, and I submitted it to the coffee experts in New York. They said that the amount was so small that in roasting and grinding they would not be able to get definite information about it, but that they did think, from the limited samples that they had, that the quality grown in Porto Rico was not inferior to the quality of the same varieties grown in other parts of the world. This year those trees will yield a little more, and by next year there ought to be enough of perhaps half a dozen of the more prominent world's varieties of coffee so that we would get a thorough test as to the quality of those varieties that have been brought from Java and Arabia and other places, and will have been grown then for five years.

The CHAIRMAN. In what manner do the methods of curing influence the flavor?

Mr. EVANS. That was a matter that was taken up by Dr. Oscar Loew, who was in the Department, and afterwards went to Japan, one of the greatest authorities in the world on the subject of fermentation, and he has investigated the subject and prepared a manuscript which has been submitted for publication on the subject of fermentation, not only relating to coffee but to cacao. The fermentation processes of the two are very similar.

The CHAIRMAN. Are you doing anything else in Porto Rico except conducting these experiments in coffee?

Mr. EVANS. We are conducting experiments on a great many lines. We have taken up the subject of citrus fruit growing and pineapple growing, and the shipment of those products to the mainland, to New York mainly.

The CHAIRMAN. With what results?

Mr. EVANS. The results have been that it has been found possible to grow a very superior pineapple and market it in New York with a fair degree of success, but with a promise of a great profit if the transportation facilities between Porto Rico and New York should be changed so that cold storage or a better ventilation on shipboard should be provided.

The CHAIRMAN. Have they never had any commerce in pineapples there?

Mr. EVANS. Practically none until within the last three years.

The CHAIRMAN. They have always been grown on the island?

Mr. EVANS. Yes; the Porto Rican pineapple has been carried to Florida and to a good many other regions; but the commerce, the shipping, and canning of them, has been something that has developed within the last three to five years. There are a number of canneries in the southwest part of the island where the station is located. This is the principal pineapple district of Porto Rico, and there are two or three canneries down there in operation, one of them built this last year, and the shipping of the pineapples has been taken up. Nearly all of them have to go from that district to San Juan by rail, and then they are put on a steamer and have a five or six days' journey from there to New York. The result in large shipments has not been satisfactory. In small shipments they have come to New York in splendid condition. I have had pineapples here in Washington received from the station at Mayaguez, and have kept them in good condition for ten days after receiving them, in mid-summer, when the temperature was high and the humidity was great. There is no reason why they should not be shipped successfully, except that when they get large quantities they are put in the holds of the vessels; and there is no tropical fruit, or no fruit of any other kind, that will go through in an unventilated place and be carried through the tropics and arrive in good condition.

The CHAIRMAN. Have you had encouraging results in any other line of experiment?

Mr. EVANS. We have been carrying on in Porto Rico some experiments to improve the native stock, particularly of the horses and of the hogs. We had a misfortune, in that we lost the young stallion that we had last fall; but some of his colts are reported to have been very fine young animals. The experiments with hogs and poultry are quite successful.

The CHAIRMAN. How much property does the Government own there?

Mr. EVANS. We have on the station farm 235 acres. On that there are no buildings except the old plantation buildings, and we have had to make those over into almost any sort of a makeshift laboratory. The principal building consisted of a one-story sort of a brick building covered with plaster, a long low building that was originally used as a sugar house. We have divided that up into rooms, and we have made it do for the purposes of our laboratory, although it has been very inadequate.

The CHAIRMAN. You have not done anything in the line of developing sugar down there?

Mr. EVANS. The sugar business has not been considered very much. We have had these other problems. We are doing something in the way of studying the fertilizer requirements of sugar, and through the courtesy of the commissioner of agriculture of the British West Indies we have succeeded in getting a number of seedling varieties that are proving very valuable for the West Indies. Sir Daniel Morris gave our station, from the limited supply they had, a number of these, and two or three of them are proving well adapted to conditions in Porto Rico, and are yielding much higher than the varieties that are under cultivation at the present time in the island.

Mr. COOK. How does the quality of the Porto Rican pineapple compare with that of the Hawaiian product?

Mr. EVANS. If it would not be given out for advertising purposes, I would say that I do not believe the Hawaiian pineapple can be beaten by the product of any country. They grow a different variety in Porto Rico from the Hawaiian pineapple. The Hawaiian is the variety known as the "Queen," while in Porto Rico they grow the Cabezona and the Red Spanish. The Red Spanish is the one we get in our markets here. The Cabezona grows very large. I have seen them weighing 10 pounds, and they say they sometimes have them weighing 14 or 15 pounds.

The CHAIRMAN. If there are no further questions in regard to Porto Rico, I would like to have Doctor Evans tell us something about the work in Hawaii.

Mr EVANS. In Hawaii we are not doing anything with sugar, as there is a sugar planters' station there that is supported by the sugar planters, and it is not believed advisable to duplicate their work. Consequently our station is leaving sugar severely alone; but we are working along every other line to diversify the agriculture of those islands. We have worked some with coffee, with tobacco, with rice, with rubber, with tropical fruits of various kinds and their shipment, with studies of the native forage plants, with soil studies to determine some of the peculiar factors in the Hawaiian soils, and on entomological problems of various kinds, plant diseases, silk culture, and bee raising. These are a few of the subjects we have been investigating in the seven years that we have been at work down there. None of them have been completed, but along some of the lines we are getting very promising results, particularly, I might say, along the line of the rice investigations that have been undertaken and which are being carried on to a considerable extent. Rice is grown in Hawaii almost entirely with Chinese labor on leased lands, and they are paying large rentals for those lands. The result is that they grow two crops a year without any rest between the crops, and their methods are, as would be expected, rather primitive. The rice which they grow has been shown to be a mixture of a great many varieties. They did not seem to grow any pure strain of rice, and since we have been working there we have found that it has been possible to select from the rice already growing in Hawaii two or three strains that are much more productive than the average crop. In addition to that, we got about 150 varieties of rice from different parts of the world and took them down there, and two of those varieties have proved more prolific and more productive than any other rice, not excepting the selections from the home-grown Hawaiian rice.

Then on the subject of tobacco, we have demonstrated that tobacco equal to any product of Sumatra can be grown in certain regions on the larger islands of Hawaii. We experimented there for a few years and grew a tobacco for which a Seattle tobacco man offered the experiment station \$4.50 a pound for that portion of the crop which he graded and selected, a portion representing 1 or 2 per cent of the whole crop.

The CHAIRMAN. As the result of that experiment are any of the planters taking up the cultivation of tobacco?

Mr. EVANS. Last year the planters' association passed a resolution, or rather it was not exactly a resolution, but a number of planters stated that they proposed taking up the subject of tobacco in addition to their main crop, and attempting in different parts of the

islands to see what could be done in the way of tobacco growing. Our experiments have all been conducted in one district on the north side of the island of Hawaii. What can be done in other islands, we do not know, as we have not entered on any experiments there, but we believe that there are a good many localities where tobacco growing, the production of leaf tobacco, can be very successfully carried on.

The CHAIRMAN. On what one of the islands is your experiment station located?

Mr. EVANS. On the island of Oahu, immediately adjoining the city of Honolulu.

The CHAIRMAN. Have you anything to add to what Doctor True has said in regard to the work on the islands?

Mr. EVANS. Not unless it would be to explain a little more in detail some of the features. We are carrying on work at the different stations, as Dr. True told you. At Sitka we are confining ourselves largely to horticultural operations, as the conditions there do not seem to favor the larger operations. In the interior of Alaska, at Rampart and Copper Center, we are trying there the general subject of grain growing, and for seven years we have ripened oats and barley, and a number of years have ripened wheat and rye at Rampart, which is 450 miles at least from the mouth of the Yukon River, and is way up nearly to the Arctic Circle. There is a large area in that region that is believed by Professor Georgeson, who is the special agent in charge of this work, to be adapted to cultivation similar to that we have been carrying on at Rampart. We have opened up this last fall, and expect to carry on, work at Fairbanks, or near Fairbanks, the station there being situated on the Tanana River nearly in the center of the Tanana Valley, where Professor Georgeson thinks there are unlimited agricultural possibilities. We not only are trying the subject of growing grain, but of hay making. The subject of forage is one of very great importance there for the winter season. We were helped along last year very materially by unusual conditions, in that at Copper Center there was a severe frost that came and injured a good portion of our grain, and we made hay of it, selling it to the mail contractor who was very glad to get the supply, which otherwise would have had to have been packed in or hauled in from Valdez along the route from Valdez to Circle.

Mr. STANLEY. Have you done anything with the native grasses there?

Mr. EVANS. Wherever you can get the natives to cut them. It is very difficult and troublesome even to get areas sufficiently level, and to get them in any quantity. In a number of instances where men have taken up regions and rolled the ground or leveled it off in some way, it has been possible to cut these, and they are very good grasses. Some grasses that grow in Alaska are very nutritious, and in some regions they are very abundant, and they furnish a very good hay.

Then all over Alaska, as Doctor True has told you, we are carrying on cooperative experiments on the subject of vegetable growing, and are determining the varieties suited to that country. There are a number of varieties that we find can be safely recommended for growing almost anywhere in the country. Of course the variety would depend somewhat on whether you were on the seacoast or in the interior. Professor Georgeson has varieties that he can recom-

mend now for the interior or for the coast regions, for the Yukon Valley, or for the peninsula, out at the western part of Alaska, or the southeastern part about Sitka.

The CHAIRMAN. Are the people taking up these lines as the result of Professor Georgeson's work?

Mr. EVANS. We think so. As far as we can find out, although it is difficult to get the information, we have learned that there has been considerable shipment of agricultural implements to that country in the last five or six years, a thing that perhaps did not happen before that time, and we know a number of men who are taking up farms; we know that the number of homesteads that have been taken up in Alaska, not as mining claims but as homesteads, has increased materially in the last few years, and I have had reports from perhaps 50 different individuals who are to a considerable extent, some of them entirely, supporting themselves by the crops and the garden vegetables that they are growing.

Mr. STANLEY. Speaking of this tobacco which is raised in Hawaii, do you raise that Sumatra leaf under cover?

Mr. EVANS. We have a peculiar condition where this tobacco is grown. It is grown on the side of one of the largest mountains in the islands, an old volcano, and we do not grow it under shade. We have found this is unnecessary, for along about 10 o'clock in the morning there is a fog bank collects against the upper part of the mountain, which shades the fields perfectly, and that disappears along toward evening, leaving a few hours' sunshine in the morning and a few hours in the evening, while during the hotter part of the day it is completely shaded by this fog bank that collects against the side of the mountain every day.

Mr. STANLEY. Can you find that condition in many places in the islands?

Mr. EVANS. I do not know that that has been investigated. We did start on some other tobacco experiments in which we tried growing under shade; but a strong trade wind came along, or a kona, rather, and our shade was found up in the upper end of the station in a gulch, mixed up with some trees, in such condition that we could not use it any more; so we gave up the subject of trying to grow tobacco under shade.

Mr. STANLEY. On which island was this experiment attempted?

Mr. EVANS. In Oahu, over in the Hamakua district. There is considerable area there, under the conditions which prevail in that mountain with its fog banks, which could be given to that culture alone.

Mr. STANLEY. You speak of there being débris from the volcano. Does that give that soil qualities that enable it to produce excellent tobacco?

Mr. EVANS. All the soils in Hawaii are volcanic in origin. The quality of the tobacco so far has surprised everyone that has seen any of it.

Mr. STANLEY. Is that like the Philippine tobacco?

Mr. EVANS. Quite similar.

Mr. STANLEY. Or the Porto Rican tobacco?

Mr. EVANS. No, it is more like the Philippine tobacco. Our experiment has been almost entirely in growing wrappers, not fillers.

Mr. STANLEY. Is the tobacco dark like the Philippine tobacco?

Mr. EVANS. It varies, but perhaps a larger proportion of it is darker than where it is grown under shade in the east. What we grow is cigar tobacco, and is wrapper tobacco almost exclusively.

Mr. COCKS. Do you find that you get any cooperation on the part of the Hawaiians?

Mr. EVANS. They are cooperating more than they did formerly. We went in there with rather adverse conditions.

Mr. STANLEY. So far you have not come in contact with the American Tobacco Company in your various projects?

Mr. EVANS. We have not met with any opposition, but they have sent a man down there to see what the possibilities are, based on the work we have done. There are a number of people who have taken up the subject of tobacco growing in a small way. There are more who are taking up the subject of truck and fruit growing, and the shipment of vegetables and fruit, and we have demonstrated, this last summer, the possibility of the shipping of Hawaiian fruits to Chicago, and from Chicago back to Denver, and putting them before the Denver Board of Trade in a perfect condition. We had there the advantage of a ventilated steamer, and of refrigeration from the Pacific coast to Chicago and from Chicago back to Denver.

Mr. COCKS. You are doing considerable with the rice business?

Mr. EVANS. I explained the rice business that we were doing a while ago. We have made some marked progress in the subject of rice.

Mr. COCKS. The director told me he got better cooperation from the Chinese rice planters than from anybody else in the islands.

Mr. EVANS. That is true. On an estate which is leased by a Chinaman there have been given us 3 acres of land for carrying on our experiments, and those rice lands rent for from \$40 to \$100 an acre down there. This man has given us this land to carry on our experiments, and they follow the work closely and have been very much interested in it. We are getting cooperation in the fruit business, and in our recent experiments in rubber, in order to help supply the world's demand for rubber. The subject of the cultivation of rubber of the different varieties has become a very important one, not only through the old countries where the wild product has been produced, but the extension has been very great in the last few years, and it has been taken up in Hawaii. Mr. Smith, our special agent, has devoted quite a good deal of time to the consideration and study of that subject and has imported from various parts of the world a good many different species of rubber-bearing plants, and has carried on, on some few trees that are already down there, some rubber-tapping experiments that have been very successful.

At 12 o'clock m. the committee took a recess until 2 o'clock p. m.

AFTERNOON SESSION.

The committee met at 2 o'clock p. m., Hon. Charles F. Scott (chairman) in the chair.

The CHAIRMAN. In connection with what Doctor True has said as to the publication of the Experiment Station Record, Representative Cole, one of the members of the committee, who is unable to

be here this afternoon, asked me to place in the record a letter which he has received from the director of the Ohio Agricultural Experiment Station, at Wooster, Ohio, strongly commending the publication of this record, and with the consent of the committee I will ask that it be incorporated at this point.

The letter referred to is as follows:

OHIO AGRICULTURAL EXPERIMENT STATION,
Wooster, Ohio, January, 10, 1908.

Hon. R. D. COLE, Washington, D. C.

DEAR SIR: I wish to call your attention to that part of the estimates of the Office of Experiment Stations, United States Department of Agriculture, providing for additional work on the Experiment Station Record. This publication is a summary of the work of the American experiment stations. It is ably edited and carefully indexed, and I find it of invaluable service in keeping track of the work of agricultural investigation in this country.

Had that Office performed no other service that the publication of this journal it would have abundantly earned all the support that has been given to it by the Government, but its services in other directions have also been of the highest value.

Scientific research in agriculture is now being conducted by practically every civilized country in the world. We receive at this station publications on this subject in eleven different languages, and we know that work of very great value to us is contained in some of these publications; but I need not remind you that the man who has obtained a working knowledge of more than two or three languages besides his own has had very little time to qualify himself for scientific investigation.

I am sure that you will agree with me that if American research in agriculture is to be conducted to the greatest advantage, those who are engaged in the conduct of this work must know what the rest of the world is doing along the same lines.

I am sure that you will also agree with me that it would be a wasteful method, even if it were possible, for each experiment station to employ translators familiar with all the languages in which this work is being conducted.

The Office of Experiment Stations now has the necessary organization for executing this work. It is already publishing the titles of most of the work published in foreign languages. These titles, however, are of little service to him who can not use the languages in which they are published. With a comparatively small extension of its resources this office might collect the results of the world's investigations, have them translated into English by experts, and thus place them at the disposal of every American investigator.

Such a scheme would cost something, it is true, but the cost would be insignificant as compared with the value. It would mean the employment of able translators, and it would mean the issuance of the Record weekly instead of monthly.

In my judgment there is no work which the United States Department of Agriculture can undertake to-day which would be of greater value to the agriculture of America than that of bringing before the men who are engaged in agricultural research the fruits of such research, as conducted in all other countries.

Yours respectfully,

CHAS. E. THORNE, Director.

STATEMENT OF MR. A. C. TRUE—Continued.

The CHAIRMAN. Doctor True, calling your attention to the paragraph at the bottom of page 44 in regard to the nutrition investigations, I presume the idea is simply to have continued here in Washington the work that was being done along that line in Connecticut.

Mr. TRUE. That is, that portion of the nutrition investigations which was formerly carried on in Connecticut it is proposed now to carry on here in Washington. But that is only a part of the entire

enterprise. The same general policy with reference to the enterprise as a whole would be followed out, that is, we would carry on investigations in a number of States in cooperation with the agricultural colleges and experiment stations.

The CHAIRMAN. Is that cooperative work being done now?

Mr. TRUE. No, sir; there is no appropriation for that purpose.

Mr. LAMB. Is that the same character of work which is being done by Doctor Wiley?

Mr. TRUE. Doctor Wiley deals with matters which relate to the adulteration of foods. We have nothing to do with that.

The CHAIRMAN. Would not this work more properly come under the Bureau of Chemistry? Would it not require constant chemical analyses in order to determine what results you are getting?

Mr. TRUE. In connection with this work there is a considerable amount of chemical work, but it is an entirely distinct investigation, and I do not see that it would involve any waste in the expenditure of funds for it to be carried on as it has been carried on hitherto, as a separate investigation.

The CHAIRMAN. Is there anybody in your office who has been doing work of this kind?

Mr. TRUE. Yes, sir.

The CHAIRMAN. What is he doing now, or what has he done along that line?

Mr. TRUE. We have connected with the office at the present time in Washington two men who were formerly engaged in the nutrition investigations in Connecticut. One of those was for a time, in the last years of the work, the chief of the nutrition investigations, Doctor Langworthy. He has had a long experience in connection with such work. The other man was at Middletown and took part there for a number of years in various lines of work. He was especially familiar with the elaborate apparatus called the respiration calorimeter which was devised at Middletown, Conn., and which it is proposed to set up in the department here in Washington.

The CHAIRMAN. What have these two gentlemen been doing since the work was discontinued?

Mr. TRUE. Doctor Langworthy has been for a number of years connected with the work in Washington, and has had work on the Experiment Station Record. When the nutrition investigations came to an end he was transferred to our lump sum roll, and has been engaged in work on the Experiment Station Record, abstracting especially those matters which relate to animal nutrition and production, and certain technical and scientific publications in animal physiology, which come to us from time to time. He has also necessarily carried on some work connected with the nutrition investigations during the fiscal year.

He had charge of the packing and removal of our respiration calorimeter and apparatus at Middletown and closing up that office, and he conducted whatever correspondence we had along these lines; but his main work, and of course if the appropriation is not continued that will be his whole work in the future, is in connection with the general business of the Office of Experiment Stations. Doctor Milner was transferred also to our lump-sum roll to fill a vacancy caused by the resignation of one of our men connected with the

editorial staff of the Record, Doctor Milner having had considerable editorial experience. That might be a permanent arrangement or not in the future, according to circumstances.

The CHAIRMAN. Were any other men who have been connected with the nutrition work in Connecticut brought here to the Department?

Mr. TRUE. No, sir.

The CHAIRMAN. Or retained in the service in any capacity?

Mr. TRUE. No, sir; I think not.

The CHAIRMAN. Do you know how much of the \$5,000 it cost to move the apparatus?

Mr. TRUE. We have a balance of somewhat over \$3,000.

The CHAIRMAN. In regard to your irrigation and drainage investigations, I notice that you do not ask for any increase, and I presume the expectation is simply to carry forward the work along the lines on which it has been going?

Mr. TRUE. Yes, sir.

Mr. COOK. In your estimate here, out of Washington, as to the irrigation engineers, experts, scientific assistants, and irrigation farmers, where are these gentlemen located, where are they employed? I am speaking now of the irrigation engineers and scientific men, not the drainage men.

Mr. TRUE. We are, or have been, carrying on investigations in all the States where irrigation is used, so that they are employed in different places throughout the west.

Mr. COOK. Do you recall how many men you have had in Colorado during the past year?

Mr. TRUE. I can not tell the exact number. It is possible Professor Fortier can tell you.

Mr. FORTIER. Our Mr. Roeding has been in charge of the work in both Wyoming and Colorado.

Mr. COOK. Where is he located?

Mr. FORTIER. He has been located at Cheyenne, and then we have had a man at Canyon City doing some work in the fruit orchards there, determining the best methods of applying the water, comparing your Colorado methods with the California methods, and the like. Then there is another man at the station at Eads, in the eastern part of the State. We have established a pumping plant there, and we are pumping water from a deep well to find out what can be done with a limited amount of water in that dry region. Then we are cooperating in your State also with the sugar beet company; I can not recall the name of it.

Mr. COOK. The American Beet Sugar Company?

Mr. FORTIER. Yes, sir; and the sugar beet company has been kind enough to set over or hand over a tract of land planted with sugar beets, and permit us to experiment in any way we please, using a large amount of water on one planting of beets, and a small amount of water on another. Then we have experimented also in the manner of applying water with deep and shallow furrows, and the number of applications which should be given in a season. All of these problems have been taken up in connection with that work.

Mr. COOK. Were they taken up in the last year?

Mr. FORTIER. Yes, sir.

Mr. COOK. In the Greely district, Fort Collins?

Mr. FORTIER. Our officer reported upon the potato growing in the Greely district some years ago, but I think very little was done in that district during the past season. Mr. Roeding is completing a report which will soon be ready for the Government Printer, showing the results of our work in Colorado during the past season.

Mr. COOK. I would like to ask you if it would not be very much better for the good of the service if your expert who has that line of the work was located at Fort Collins, where our State agricultural college is located, and not at Cheyenne? There is not much farming about Cheyenne, or in Wyoming, for that matter.

Mr. TRUE. I want to explain his location at Cheyenne. We maintain at Cheyenne a somewhat general office, in connection with which we have the rating of our instruments and the supervision of work in several states, and that has accounted for the fact that Mr. Roeding happens to have headquarters at Cheyenne.

Mr. COOK. I ask that question; could you not do better work in your experiments by having your man located where there is a large amount of farming done? There is no farming except a little gardening done at Cheyenne, and very little in the State of Wyoming; it is almost entirely a stock State, devoted to stock raising and mining.

Mr. TRUE. One object of our investigations is to develop irrigation where it does not flourish. In Colorado, especially in the Greely district, irrigation has been remarkably successful, and while we want to help the people there in every way we can, we do not feel that they need the help perhaps so pressing as the people do in other regions where irrigation is not so fully developed. The work that Mr. Roeding has had especially in hand has been the question of what can be done with small water supplies by means of pumping, and of other means of getting it on to the land, and he has therefore had to work in connection with a number of stations in Colorado, as Professor Fortier has indicated, at Cheyenne and one or two other places where the question is whether we can not develop sufficient irrigation to supplement what is ordinarily called dry farming, so as to make the best use of small water supplies, to insure the farmer in those dry regions against absolute failure of crops. From our point of view dry farming, while it is a useful thing and in certain years is very profitable, has a large element of risk in it, and what we are trying to do through our work is to find out if we can not insure the dry farmer so that he can go on safely and establish himself and have a pleasant and profitable homestead by the use of such water as he can get, though it may be in limited quantities.

Mr. COOK. In one county alone in eastern Colorado there was more dry farming conducted during the past year than in the entire State of Wyoming.

Mr. TRUE. There is a considerable amount of it, there is no doubt of that.

Mr. COOK. Therefore I do not see what advantage the Department gains by retaining these headquarters at Cheyenne.

Mr. TRUE. It might be somewhat of a question if they were maintained simply for that purpose; but we have them also as a convenient place for the rating of our instruments and for other general

business connected with our investigations in a number of States. That is an old arrangement that has been going on for a number of years, and we have not seen any good reason to change it; but we desire to do, at the same time, for Colorado whatever is best.

Mr. COOK. I am free to say I do not believe that we have had very much help from your bureau in our State, based on the lines of progress we have made in farming, both by irrigation and dry farming. Therefore we would like to have you get a little busy in our State, which you know is becoming very prominent as an agricultural State as well as otherwise.

Mr. TRUE. We understand that, and one reason that we have not done so much in Colorado as in some other places was because you were so well off relatively; your irrigation work has been so remarkably successful that it is an example for other States, and we have been working in places where there was more need for immediate development.

The CHAIRMAN. Perhaps it would be better to have Doctor Fortier give a general review of the work, and particularly I would like to inquire whether any line of investigation that has been going on for the last few years has been completed; whether results have been reached on any line of this work which would render the continuance of the work unnecessary, or whether it ever can be completed.

Mr. TRUE. May I make a brief statement in reference to the organization of the work as a whole?

The CHAIRMAN. Yes.

Mr. TRUE. This irrigation and drainage work has been carried on for a number of years, and during the period up to last fall was under the charge of Dr. Elwood Mead; but he was invited by the Australian government to undertake a large work in irrigation in that country at a salary far beyond what we could offer him, and on his withdrawal it was deemed best to divide the work into two sections and put in charge of the irrigation investigations Doctor Fortier, who had for a number of years had charge of our work on the Pacific coast, having his headquarters at Berkeley, Cal. He has had wide experience in the irrigated regions, having worked in connection with the experiment station in Utah, and afterwards as director of the experiment station in Montana.

The drainage work has been put in charge of Mr. Elliott, who for a number of years has been our chief drainage engineer. As an administrative proposition we think that will strengthen the work, and at the same time make the expenditure of funds fully as economical and more effective. As the irrigation work has developed, it has naturally been carried on for the most part west of the Mississippi River, though we have done a little in the east in looking into the business of irrigation as practiced in a comparatively small way in the humid states; so that the concentration of that work under one man gives him a sufficiently large field, I think, and at the same time a field that is more manageable than the entire country.

On the other hand, the drainage work is carried on principally in the eastern half of the country, though we have some drainage work in the west, even as far west as Oregon, and thus the drainage expert has a somewhat definite field of operations. This will not involve any great change, however, in the general policy of either the drain-

age or irrigation investigations. The general policy pursued in these investigations hitherto has been to help the people in different parts of the country to help themselves. You understand that we have nothing to do with the construction of works.

That belongs entirely to the Reclamation Service. What we are doing is to solve what may be called the agricultural problems relating to irrigation and drainage, and we take hold of those as they are of special interest to communities and regions, so that it is a matter of public interest. That is, our work in these lines may be compared in a way with a certain portion of the work of the Forestry Bureau in its efforts to aid forest managers, lumbermen, and so on, in the making of plans for the conservation of forests, and the work of the Office of Public Roads in helping on the cause of good roads. I think perhaps that is all I need to say, Mr. Chairman.

The CHAIRMAN. You do not think this division will result in the building up of two offices with two sets of clerks and a corresponding increase in administrative expense?

Mr. TRUE. No, sir.

The CHAIRMAN. It will be a happy disappointment if it does not.

Mr. TRUE. Under the new arrangement matters which are common to both of these interests and the general business relating to the Department and to the outside world—the distribution of publications and so on—are brought into my office and transacted in the office in detail through my chief clerk. That, I think, is a better arrangement than we have ever had, and a more economical and effective one; so that in making the new arrangement, as the result of our experience, I think we have done what we could to protect the public funds and to provide for their economical expenditure.

The CHAIRMAN. We are glad to learn that. Of course our experience has been heretofore that wherever the work that had formerly been carried on under one head was divided it very soon developed that there were two chief clerks needed instead of one, and four stenographers needed instead of two, and so on down the line; but you seem to have guarded against that, and we are correspondingly grateful.

STATEMENT OF MR. SAMUEL FORTIER.

The CHAIRMAN. Mr. Fortier, you heard the question I asked a moment ago. It was intended merely to bring out a statement as brief as you can make it and present all the points that you wish to cover of the work of your irrigation office, particularly with a view to advising the committee whether you have fully completed any line of investigation.

Mr. FORTIER. I think I can give the committee, sir, an idea of our work in a very few words. I believe that the most important work that we have done in the past nine years has been the prevention of waste of irrigation water. As nearly as I can estimate it, we are spending west of the Missouri some \$50,000,000 to \$60,000,000 a year for water, in procuring it and applying it to the surface of cultivated fields. Those of us who have been working at this problem for the past twenty years believe that the greater part of this is wasted. I believe it would not be an overstatement to say that three-fourths of

that amount of water subserves no useful purpose in nourishing plants.

Do not misunderstand me; I will not go so far as to say that that three-fourths can be saved, or all of it, but I believe it possible, gentlemen, to save quite a large part of the amount of water that we are now wasting in its application to the soil. We thought that was the most important work that we could take up in the western part of this continent, over two-fifths of the entire area of the United States, some nine years ago, when our little branch was established, and we still think so, and we intend to keep on working at that problem. I can tell you now in a very few words how this water is wasted. You gentlemen who have traveled over our part of the country know that we tap streams and convey that water long distances over gravelly benches, etc. The early pioneers had no end of difficulties to encounter, and they were not able to dig their ditches and establish homes in a desert and at the same time line those canals. They had to get along as best they could, and the result has been that a large amount of water is wasted before ever it reaches the headgate of the farmer. These things are going on, and the farmers under these canals have very little idea of these losses. They know that more water is admitted through the headgates than they receive down below at their farms, but they have but a faint idea as to where it goes.

I remember one man in Montana who was riding with me; he had been a ditch superintendent for thirteen years, and his idea was that all of this water went up into the air; but when I showed him the results of our measurements of that canal near Billings, and told him that about one-third of the loss was caused by percolation into the ground, he was surprised. That may serve as an illustration of the idea that prevails. So we go in there and make these determinations to find out where these losses occur, and suggest to the best of our ability the means of preventing them. We have found, gentlemen, that these losses amount in many cases to 40 or 50 per cent of the total amount of water admitted. The average would be very much less than that, but I believe it would not be much below 30 per cent. That is only one of the causes of the loss of irrigation water in the western country. Another cause is the careless methods of application. The same necessities which obliged the early pioneers to build crude ditches also obliged them to prepare their fields in the crudest possible way. Anything to get water on the land; anything to get the first crop started. Now we think that that can not go on forever, and we are trying to introduce better methods. To show you what it costs to properly prepare land for irrigation, I want to illustrate what we have been doing in California.

The University of California recently bought a large farm north of San Francisco, amounting to nearly 800 acres, and our office was asked to supervise the laying out of that farm and the irrigation of it, and we went in there last fall, and it has cost \$30 an acre to prepare that land for irrigation. That shows you, I think, the importance of the agricultural side of irrigation. That is apart altogether from the building of the dams and canals. That is simply what the farmers have to do.

Mr. LEVER. What do you grow on that land?

Mr. FORTIER. We are preparing it for alfalfa particularly. That is considerably above what the farmer pays for water, what he pays for preparing his land, because the State of California could well afford to prepare its model farm much better than the ordinary farmer prepares his farm, so that we have it about as level as this table, with borders on each side, and we turn the water in here and force it down to the other end of the tract, some 800 or 1,000 feet.

Another way in which we are losing water in the West is by evaporation. There is an enormous amount of water that passes up from the surface of cultivated soil, cultivated and irrigated soil, into the atmosphere, and nobody knows how much. It is a question that is not studied, and we are right at the A B C of it. Some two years ago we went into Riverside. Many of you are familiar with the citrus orchards of that region. This much must be said of southern California, that they use water more economically than almost any other section of our western country, but even there I found that some 30 or 40 per cent of that water, which costs them from \$20 to \$25 every year per acre, passed up into the atmosphere without doing any good at all to the orange trees. That amount of what was spread over the surface simply evaporated and was lost.

Mr. POLLARD. There is no way of preventing that, is there?

Mr. FORTIER. We think so; yes, sir. We realize that we are at the beginning of things, but we have found, sir, that by applying the water several inches below the surface it is almost a complete protection. We had large tanks established there, holding more than half a ton of soil, right out in the orchard. This work was not done in the laboratory at all. I do not much believe in that, because where you are working for the farmer you have to do it in his way, and so we built these large tanks in the orchard, between the trees, and we irrigated these tanks, one on the surface, one 2 inches below the surface and another 4 inches below the surface, and so on up to 10 inches, and we found when we had 8 inches of dry soil mulch above the moist earth it was a complete protection.

Mr. HAWLEY. I do not see how you could apply the water.

Mr. FORTIER. We make deep furrows; those furrows may be 9 or 10 inches in depth, and we run a small stream in the bottom of that V-shaped furrow, and then when the soil is sufficiently wet underneath, it is harrowed, and dry soil mulch is put into this furrow. We think a great deal can be done to prevent the passage of soil moisture and irrigation water into the atmosphere in the dry States and Territories of our western country. I remember our thermometer read at midday in hot weather 150° in the sand there.

Mr. HAWLEY. How do you make these V-shaped furrows?

Mr. FORTIER. With just an ordinary cultivator; and they have special shovels that they put on for that purpose.

The CHAIRMAN. In regard to this matter of evaporation, is it your judgment that a study of the evaporation from the Salton Sea would be of any use to you in determining the evaporation that might be expected to take place in reservoirs located elsewhere in the country?

Mr. FORTIER. No, sir; we think it would not be of very great benefit. We are doing this much in that same locality, sir. We have a vessel, and for four years, I think, we have determined the rate of evaporation from that vessel, which is located near Calexico, near the Mexican line.

The CHAIRMAN. Do you think an experiment of that kind, simply noting the rate of evaporation from a small vessel, would give you practically as reliable results as could be obtained from the study of a large area such as this lake, the Salton Sea, affords?

Mr. FORTIER. In one sense it would, because it comes nearer the farmer's conditions. He runs water into a small tract of land, a quarter of an acre in extent, and a certain amount of water is lost by evaporation in the alfalfa check, we will say, and we think this vessel which is much smaller, it is true, than the check, will give him fairly reliable results.

Mr. POLLARD. That would apply to the evaporation from ditches where you are running the water out on the land; that would not apply to the reservoir?

Mr. FORTIER. That would not apply to a larger area, but we think that properly belongs to the Reclamation Service or to the United States Geological Survey, and we try to keep out of those projects. We have only a small amount of money, and we have to make it go as far as we can, and we are trying to benefit the farmer, taking up these problems of the irrigator.

The CHAIRMAN. Do you think any considerable number of the farmers have been practically benefited by the work you have just indicated?

Mr. FORTIER. There is no question of that in my mind. I have been engaged in this work for over twenty years, and I have grown up with it, so to speak. I have been engaged in most of the features of irrigation work, building the dams and storage reservoirs and irrigation canals, and up to the farmer's end of the problem, and in recent years I think that the agricultural side of irrigation far transcends any other feature.

The CHAIRMAN. You think, then, conditions are improving as a result of the work your office is doing?

Mr. FORTIER. Without doubt. A great many ditches now are lined.

The CHAIRMAN. Have you practically completed your research work, and are you now prepared to demonstrate the facts that you have acquired?

Mr. FORTIER. No, I think it is just beginning. I believe that this work will go on and be much more important one hundred years hence than it is now.

The CHAIRMAN. Do you mean to say that it is likely to take one hundred years or more to complete the researches that you have been carrying on for the past nine years?

Mr. FORTIER. Part of these will be completed, but I am not sure that I should say that we have completed any finally, because we have such a large territory to go over, and with our small amount of money we have not been able to cover 10 per cent of the irrigated regions of the West.

The CHAIRMAN. Does not each field, almost, show a different problem for itself?

Mr. FORTIER. Yes, sir. To illustrate that, we can not take the methods prevalent in the orchards of Riverside and introduce them in the Sacramento Valley. We would become a laughing stock if we were to suggest the introduction of some of the methods. We have to take each field by itself and study the problems connected therewith.

The CHAIRMAN. Are you getting to the people in a practical, useful form the information you have acquired thus far?

Mr. FORTIER. I am coming to that. We have been talking thus far on one of the features of our work, namely, the prevention of the waste of irrigation water. Another feature is that which you have suggested. We realize that we are at a transition period in the West. It has taken us 60 years to irrigate eleven or twelve million acres, and in about 18 months we will have 5,000,000 acres in addition ready for the plows of the new settlers; and so there has been a much greater demand on our work, and to meet that we have been preparing a series of practical publications.

There is a good deal of data that we have collected during the years we have been engaged in this work that have not been published, and we intend to take all that material that is of any value and add to it and prepare a series of publications. One of those will be on alfalfa, showing the new settler, and the old settler, too, if you like, how to irrigate and how to prepare the fields, grubbing out the sage brush and building checks, and how much water to apply; and all these problems we intend to take up in this little publication, and in the same way we want to take up the irrigation of orchards and sugar-beet irrigation and the irrigation of grain and vegetables and the irrigation of rice in the Louisiana and Texas fields. Then we have another publication in view dealing with irrigation in humid climates. We get a great many calls from humid portions of the United States for information on the irrigation of truck fields and meadows, and we think it would be well to devote a small part of our appropriation, \$2,000 or \$3,000, every year to that purpose.

The CHAIRMAN. Will you be able to present these facts in bulletins in such a way that the ordinary farmer can understand and use them?

Mr. FORTIER. Yes, sir; if we fail to do that, we have failed indeed, because our purpose from the beginning will be to present the matter in such a way that any farmer of ordinary intelligence would be able to understand it.

Mr. POLLARD. Do you carry on any demonstration work in cooperation with the farmers?

Mr. FORTIER. We have a number of those, and we believe in them.

Mr. POLLARD. Whereabouts are you doing that?

Mr. FORTIER. We are cooperating with the University of California in the Sacramento Valley, and we have established a number of demonstration farms in the Rocky Mountain States, two in Wyoming, and others elsewhere.

Mr. POLLARD. Do I understand that this work you have done in California is on a State farm—I mean on a farm owned by the university?

Mr. FORTIER. Yes, sir; I should explain that, however. Four years ago the legislature of California appropriated a certain sum of money to be used in the investigation of the farmers' problems in irrigation, providing our office would put up a like sum. We have put up dollar for dollar ever since. They appropriated four years ago \$10,000 for the biennial period. We appropriated a like sum. Two years ago they appropriated \$15,000 for the biennial period, and we placed the same amount beside it; and we get more than that out of it, because in many cases the farmers, in instances like the Modesto and Turlock

irrigation districts, are willing to add another sum if we will only cooperate with them.

Mr. LEVER. And investigate their projects?

Mr. FORTIER. Yes.

Mr. POLLARD. Do any of the other States of the West make an appropriation for this purpose?

Mr. FORTIER. The States of Utah, Nevada, and Nebraska make appropriations on the same conditions and we hope in time that our money will be increased in that way. We think it a good business proposition, because for every dollar we expend of Government funds, \$1 and sometimes \$2 is added from other sources.

Mr. POLLARD. I understood from what you said that at least one of these cooperative demonstrations carried on was on the university farm; is that correct—that you went in and surveyed the farm and laid out the work?

Mr. FORTIER. We did that in cooperation with the State, and we had just the supervision of it. As Doctor True suggests, they paid for it.

Mr. POLLARD. They did not pay the salaries or the expenses of the Government representatives?

Mr. FORTIER. No, sir.

Mr. POLLARD. Did not the university have men there specially skilled in this line of work, who could do it without aid from the Government?

Mr. FORTIER. I presume they had, but in this cooperative work with the State they have put up, as I say, an equal amount of money, and we thought we had no right to refuse when they asked us in that way.

Mr. POLLARD. You do not quite understand my point, I think. I understood you to say a moment ago that a farm was purchased there by the State, which was, as I understood, in connection with the university; is that correct?

Mr. FORTIER. Yes.

Mr. POLLARD. And you went in and surveyed that and superintended the work for bringing this tract of land under irrigation?

Mr. FORTIER. Yes.

Mr. POLLARD. The thought I had in mind was this, that the university there certainly ought to have men specially skilled in this line of work to supervise this, rather than have the Government come in and do it.

Mr. FORTIER. Yes; but we were very much interested in that, because we were planning a number of experiments to be carried on jointly with the University of California.

Mr. TRUE. If I may be permitted to say a word in reference to that, it has been the general policy of the Department in a good many lines of work to work in cooperation with the agricultural colleges and experiment stations, and this work in California is carried on on that principle. It is the agricultural college of the University of California that has this tract of land. That land will be available to us for experimental purposes in cooperation with them.

Mr. McLAUGHLIN. At any time that you may want it?

Mr. TRUE. When we desire to have it, yes, sir. I do not think there will be any difficulty about that, and we have worked in close cooperation with them in all our work in California.

Mr. HAWLEY. Do they have an experiment station in connection with the Agricultural Department there in the university?

Mr. TRUE. Yes, sir; cooperation is going on in all the States where it has been possible for us to make such arrangements.

Mr. LEVER. You feel that you are getting as much out of their appropriation as they are getting out of yours; is that it?

Mr. FORTIER. Yes, sir.

Mr. TRUE. Yes; we make our money go a great deal further in that way than it would otherwise, and we do not want to go into the States and work independently of these institutions which are already receiving Federal funds under the acts of Congress. We want to work in connection with them wherever it is possible.

The CHAIRMAN. I understand you are also carrying on cooperative work with individuals?

Mr. TRUE. Yes, we are carrying on cooperative work with individuals or organizations wherever we can do it on favorable terms.

The CHAIRMAN. Can you give us an idea of the extent to which you are doing that?

Mr. FORTIER. I think I can in California, if Doctor True will permit me to answer that part of your question. We are now carrying on irrigation and drainage investigations in the vicinity of Fresno, and two farmers, John S. Dore and Lucius Baker, are putting up more than one-half of the total cost of the work. Then farther north in the same State the irrigation districts of Turlock and Modesto have contributed more than half of the total cost of all the investigations done in those two districts.

Mr. GILHAMS. What is the purpose of the investigations on those two farms?

Mr. FORTIER. They have used too much water. It is a case of injury caused by an overdose of water, I would say, and the result has been the rise of the alkali and the rise of the ground water until the vines were destroyed, and farms which were worth \$250 an acre can now be bought for probably \$40 or \$50.

The CHAIRMAN. That has opened up a subject that I would like to question you on just a little bit.

Mr. TRUE. May I just offer a word of explanation in connection with that? We would not go to Fresno, however, if it was simply a question of helping those two farmers. It is only because these are representative farms with reference to a large region.

The CHAIRMAN. And the results you get there will have general application?

Mr. TRUE. Yes.

Mr. FORTIER. They will apply to 60,000 acres in the immediate vicinity.

The CHAIRMAN. I think we understand that, Doctor True. Now, to what extent, either in California or elsewhere, have you worked upon the problem of relieving soils of alkali?

Mr. FORTIER. That is a question which belongs, I think, to my conferee, Mr. Elliott.

The CHAIRMAN. It does come under the drainage branch of your work?

Mr. FORTIER. Yes. Mr. Elliott was kind enough to place this Fresno work under my charge, as I had begun it.

The CHAIRMAN. Since that has come up, we might as well ask Mr. Elliott to answer that question.

Mr. TRUE. If I may say just a word in answer to that also; we do not go into the business of relieving lands of alkali except in as far as that involves what may be called engineering problems. That is, we take into account the fact, which we think has been fairly demonstrated, that good systems of drainage will relieve the lands of alkali. All our business at Fresno, and wherever else we have touched that problem, has been the study of whatever engineering problems were involved, to work out the best method of drainage.

The CHAIRMAN. Are you familiar with the work that the Bureau of Soils has done along that line?

Mr. TRUE. Yes.

The CHAIRMAN. Does your work duplicate theirs, or does their work duplicate yours along that line?

Mr. TRUE. They are studying problems of the soils related to alkali.

The CHAIRMAN. This is what the Bureau of Soils has done, or claims to have done, as I understand it. Near Salt Lake City, Utah, and in certain sections of California, they have taken lands in which the alkali had risen because of too much water having been put upon the soil in irrigation, and they have devised a method of draining that land in such a way as to relieve it of the alkali. What I desired to know was whether they had done that work independently, or whether it was entirely different from the work you are doing, or whether it is along the same line.

Mr. TRUE. Their work, as I understand it, with reference to that has been largely a demonstration of the fact that certain treatments of the soil, including drainage, will relieve the land from alkali. We have taken into account their work and the work of other people along the same line, and on the basis of that it is our business to determine what system of drainage, what engineering problems, connected with the matter are to be worked out.

The CHAIRMAN. Is there not necessarily an engineering problem in their part of it?

Mr. TRUE. They have done a little work which involves some engineering, but it is of the simplest kind, and that is not their chief study.

Mr. GILHAMS. But they are doing a good deal of that kind of work, are they not?

Mr. TRUE. They are doing some of that. I do not think their operations are carried on in a very large way or in any considerable number of places.

Mr. LAMB. If you engaged here in the work of drainage as well as irrigation under this appropriation of \$150,000, would you feel warranted in going down on the Atlantic coast and helping those people by making experiments down there as well as with these people in the West?

Mr. TRUE. Certainly; a large portion of our drainage work is in the East.

Mr. LAMB. Where are you operating now in that drainage work in the East?

Mr. TRUE. Mr. Elliott can tell you more definitely than I can; but we have a large number of places in which we are operating in that way.

The CHAIRMAN. Would you like to have Mr. Elliott answer that?

Mr. TRUE. He can tell more definitely where our work is in progress along the Atlantic coast.

Mr. ELLIOTT. To answer that question I have some small maps which will indicate the spots in which we are doing or have already done work.

Mr. TRUE. This is all drainage work which is indicated on these little maps. I would like to give in a very brief way a somewhat more comprehensive view of our irrigation work, if I may be permitted. Professor Fortier has dealt more especially with the work that is being done to prevent losses in irrigation, but we have other lines of work which are set forth, as you will see, in our reports and which are of at least equal importance. One of these is what we call irrigation extension. There has been, as you know, great activity in the West in recent years in extending the arable area, and there has been a great deal of talk about dry farming. What we want to do, what we are trying to do, is to show how small water supplies may be used, and I have already gone into that proposition sufficiently in my previous remarks; but in connection with that and with other work also in the West, there is this large question. From a study of the situation in a somewhat comprehensive way we estimate that during the present year some 5,000,000 acres of land will come under cultivation through the extension of irrigation. A portion of that is the land which will be watered by the works which are being constructed by the Reclamation Service, but that is only a small portion of the total area. Private enterprise has been very active in the West, principally as the result of Government activity, and so a great area is now almost ready for cultivation under private projects.

Mr. LEVER. If you will permit me, I would like to ask the Doctor to what extent the Government aids in this work? I am not very familiar with the conditions out there. To what extent do they do reclamation work?

Mr. TRUE. The Reclamation Service has had some \$40,000,000 as the result of the sale of public lands, for the construction of reservoirs and canals, to water in part public domain and in part private domain, with the result that they will be prepared to water, as I understand, something over 1,000,000 acres in the near future.

Mr. LEVER. With respect to the watering of private lands, is any rental paid for that water or not?

Mr. TRUE. Yes.

Mr. HAWLEY. Might I answer Mr. Lever's question in one specific instance. Over in the Klamath Basin, a great irrigation project, the farmers have bound themselves to repay in a series of payments running over ten years the cost of the works. They have bound every acre of their farms for so much money to repay the cost of irrigation service, and after the time when it is paid in full, then the system is to be turned over to the farmers and the people of that community.

Mr. LEVER. Is it done by the issuance of bonds, or something like that?

Mr. HAWLEY. No; they sign an agreement with the Government. There is a local association there which is called the Water Users'

Association, which enters into contract with the farmer, and acts as the agent of the Government in contracting with the farmer.

Mr. LEVER. Could these people have constructed it as cheaply as the Government could have constructed it?

Mr. HAWLEY. They could have done it as economically if they had had the capital.

Mr. GILHAMS. Who owns the water resources after the work is paid for?

Mr. HAWLEY. They belong to the people who have paid for them.

Mr. LEVER. This is a very interesting subject, and the reason I am so much interested in it is that we have recently passed a bill in our legislature looking to some such scheme as the gentleman from Oregon suggests. Let me ask one further question. Is the contract that you enter into with the Government a mortgage of the land, or what is it?

Mr. HAWLEY. I have not read one of them; but I know the effect of it is that if the payments are not made the land goes to the Government to be sold for the amount it was bound to. It amounts to pretty near \$30 an acre, they say, on the land in that county.

Mr. POLLARD. Is most of the land in these places where these reservoirs are constructed, and the canals run, owned by the Government?

Mr. HAWLEY. No; it is nearly all, the greater portion of it, I should think, under private ownership.

The CHAIRMAN. That is in this particular instance you speak of?

Mr. HAWLEY. Yes.

The CHAIRMAN. But speaking of the Reclamation Service generally, my understanding is that for the most part not only the reservoirs—not only the lands upon which the reservoirs are located—are under public domain, but the land which it is sought to irrigate is also under public domain.

Mr. HAWLEY. I thought he asked me about that particular project, the Klamath Basin project. There is a great deal of public land in this section.

Mr. POLLARD. I meant my question to be general. I did not have reference to this particular instance.

The CHAIRMAN. Of course I suppose that the members of the committee understand that the Reclamation Service is under the Geological Survey, and Doctor True has nothing to do with it further than to make his office useful in that connection, as he does with other irrigation projects, in showing the people who go onto these lands how to use the water.

Mr. POLLARD. That is what I wanted to inquire of Dr. True. As I understand it, then, when the Geological Survey or the Reclamation Service completes a reservoir for irrigation purposes and completes the running of canals and waterways ready for the use of the farmer, then your bureau takes it up and goes in and shows the farmer how to apply the water, when to apply it, and how much to apply, and so on; is that the idea?

Mr. TRUE. We do that on the invitation of the Reclamation Service.

Mr. POLLARD. I was trying to get at where you came in and where they quit.

Mr. TRUE. As a general proposition, you are right.

Mr. POLLARD. They do not go any further than the construction of the waterways; is that right? Then their work is done; is that right?

Mr. TRUE. They have to manage the project in so far as it is necessary to get settlers on that land. They first construct the works and then they practically go into the real estate business to get settlers on that land and to get the money paid back so that they will have more money to go on and build more works.

Mr. McLAUGHLIN. Do you know of many works that are carried on on the plan that Mr. Hawley speaks of? Is that the general plan?

Mr. TRUE. That plan is adopted, as I understand, in a number of localities in the West, and, as the chairman said, the main object of the reclamation act was to water public lands.

Mr. LEVER. After they have built these reservoirs and constructed your canals, and so on, on the public domain as an inducement to settlers to come in, the Government then sells to the settlers this land?

Mr. TRUE. Yes.

The CHAIRMAN. At the usual price, plus their portion of what the reclamation project has cost.

Mr. HAWLEY. Then, in addition, in the Klamath country they require every man who takes water to sell all but 160 acres of his land. No one can have water for more than 160 acres. Each owner must agree to sell all the rest, all the surplus of his land.

Mr. LEVER. That is in the Klamath country?

Mr. HAWLEY. Yes.

Mr. TRUE. As I said, we expect during this year to have about 5,000,000 acres of land thrown open to settlement, and the question is how to settle up the West in the best way, so as to make those communities, those new communities, as prosperous as possible from the start, and to save them loss and waste. We think we have a great work to do along that line. The people who are to occupy those lands are to come very largely either from the eastern part of our own country or from foreign countries with humid climates. They will not understand what has to be done to prepare that land for irrigation and to irrigate it in the best way, and so we are directing our policy in the conduct of this work to the study of what needs to be done in the giving of help to the settlers who are coming in in that way.

Mr. HAWLEY. A man in Klamath County has given to the Department here a tract of land where it can have the water on it for experimental purposes to show how and what can be grown, and especially how to apply the water and how to get rid of it in drainage. Is that under your bureau?

Mr. TRUE. If you had had proper negotiations, that would be a suitable thing for us to take up.

Mr. HAWLEY. He has given that land, and I understand they are preparing to operate it. I want to know whether it is under your bureau.

Mr. FORTIER. The work on that is done under a committee composed of six, I think. The Reclamation Service is represented, the Bureau of Plant Industry is represented, and our own Office is represented, and we try to combine our skill so as to produce the best results.

Mr. HAWLEY. Do you remember about this particular tract of land?

Mr. FORTIER. We have had some correspondence and the matter has been referred to the committee mentioned by Doctor True.

Mr. TRUE. It is probably in the initial stage.

Mr. FORTIER. But we are cooperating in Idaho and North Dakota.

Mr. HAWLEY. My idea was to get at whether you were cooperating in this.

Mr. TRUE. We think this a very important feature of our work, the aid that we can give, in cooperation with the other agencies of the Government and the other bureaus of our Department to these new people, to this great tide of immigration that is coming into all this western country as the result of irrigation. Under the old conditions there was an immense waste and loss because of the ignorance of the people, and we think we can avoid that and hasten the building up of prosperous communities in that region through our efforts.

Mr. McLAUGHLIN. I understood the law under which the work was being done by the Reclamation Service limited the work to certain sections of the country, naming the States in which the work was to be done?

Mr. TRUE. Yes; but that is practically all the irrigated region of the country.

Mr. McLAUGHLIN. My understanding was that it was in the West.

Mr. TRUE. That is right.

Mr. McLAUGHLIN. But this map here shows a great deal in the East.

Mr. TRUE. This map does not relate to irrigation at all.

Mr. McLAUGHLIN. It is reclamation?

Mr. TRUE. No; it is drainage.

Mr. LEVER. It does not come under the reclamation act at all?

Mr. TRUE. No.

Mr. GILHAMS. I notice on this map you have three places where you have had drainage or irrigation in Indiana, one up near Lake Michigan, up near what I suppose is the Kankakee Swamp. Do you know anything about what has been done there in the way of drainage?

Mr. TRUE. We have done quite a large piece of work. I would like to have Mr. Elliott describe it.

Mr. GILHAMS. I would like to know about it.

Mr. TRUE. However, if I may be allowed to, I would like to close out this irrigation work first.

The CHAIRMAN. Can you close that briefly? I think we have heard about all we need to hear in regard to that.

Mr. TRUE. The only other line of work I desire to call your attention to, and it is an important part of our work, is our investigation of the uses of power for irrigation. That is coming to be a very important feature of irrigation in the West, the use of electricity derived from running streams, accompanied with the use of pumps of various kinds, the use of windmills, and other power appliances, and we are studying those problems as well. We are taking up these large lines of work, and we are closing out special investigations just as fast as we get definite results. There is one large field of investigation in which we are doing now comparatively very little where once

we were doing a great deal. For a number of years the main thing we did was to find out what people actually do in irrigation, how much water they actually apply. Up to that time there had been no broad study of the actual practice, and we gathered authoritative statements as the basis for court decisions and general practice; but now we are not doing much on that. We are doing work mainly to find out what is needed, which is an entirely different thing. As Professor Fortier has indicated, very much larger amounts of water are used than are necessary.

I think I have covered the main lines of our work, and we might take up the drainage.

Mr. BEALL. You made some mention of irrigation by windmills. Do you mean to attempt to irrigate land with subterranean waters—waters that you pump out of the earth?

Mr. TRUE. Yes; water drawn from wells or streams.

Mr. BEALL. What success have you had with that? The western part of Texas has an abundant supply of underground water—water that is reached at 40, 50, and 100 feet, and there is supposed to be an almost inexhaustible supply.

Mr. TRUE. There is quite a good deal of that work going on in different parts of the West already.

Mr. BEALL. With what success and at what cost? Is the cost of that species of irrigation prohibitive?

Mr. TRUE. That depends upon the depth of the water and the amount you can get.

Mr. BEALL. Suppose the water is at the depth indicated, at a depth of 75 or 100 feet?

Mr. TRUE. I think Professor Fortier can answer that perhaps better than I.

Mr. BEALL. Is it practicable to attempt to irrigate lands with water drawn from a depth like that?

Mr. FORTIER. That will depend on the cost of pumping and the value of the crop irrigated. You can irrigate about 3 or 4 acres, raising the water 20 feet by means of a windmill. If the lift is 80 feet, the area irrigated would be proportionally smaller.

Mr. BEALL. How about pumping with a gasoline engine?

Mr. FORTIER. For deep wells and larger areas the gasoline engine is the cheaper.

Mr. BEALL. Take the best machinery for the purpose that is available and the highest-power gasoline engine, the best patent, how much land could you irrigate with an outfit of that kind?

Mr. FORTIER. There is scarcely any limit to the amount, providing you have the necessary water supply.

Mr. HAWLEY. Is the water itself pumped up from 75 to 100 feet very good for irrigation? Is it as good as the water that comes out of the mountains?

Mr. FORTIER. It may not be quite as good, but you know that most of the supplies in Southern California come from depths of 100 feet or more, but they use it.

Mr. HAWLEY. I have heard it stated that it was not so good.

The CHAIRMAN. We are ready to hear Mr. Elliott now. Will you give us a brief and rapid statement of the work you are doing?

STATEMENT OF MR. C. G. ELLIOTT.

Mr. ELLIOTT. The drainage investigation has to do with the removal of surplus water from the soil and from the lands which may be made suitable for agriculture. We have done that kind of work in the irrigated sections where the excessive leakage of canals or over-irrigation has produced swamps and destroyed the land.

We also take up the drainage of swampy and wet lands in the humid regions and determine what methods should be used, what kind of ditches, how large, and the general plan and system that should be used for the drainage of farm lands. The first work done was in the irrigated regions, and our first investigations were in the Fresno district of California in 1902, when the Office of Experiment Stations, after a survey of that territory, an examination of the conditions of soil water, developed a plan from those surveys which was recommended and published, and the work which is now being done is practically carrying out those recommendations which were made in 1902.

The CHAIRMAN. Who is doing that work now?

Mr. ELLIOTT. That is done by this Office, under the direction of Professor Fortier.

The CHAIRMAN. Is the Bureau of Soils doing any work in that section?

Mr. ELLIOTT. No, it is not.

The CHAIRMAN. On this same line?

Mr. ELLIOTT. No, sir. The Bureau of Soils is not doing any work of that kind anywhere, I understand. It has abandoned that feature of the work.

The CHAIRMAN. Did you do any work of that kind in the Salt Lake Basin?

Mr. ELLIOTT. No, we did not. We have, however, done work in six counties in Utah, in the farming districts, where under an appropriation made by the State and an allotment set aside by our Office we have for three years been carrying on experimental work by co-operating with the farmers, the examination of special locations, the superintending of the drains that are laid, and the recording of observations of their effects. We are now preparing a report upon the results of the entire work done by this Office in the drainage of irrigated lands, which will cover the work done in Utah and also in the State of Washington. We found that the excess of water produced alkali conditions of the soil and that when that water was removed we had removed the cause of the accumulation of alkali. However, there is a great deal of land which is ruined by excess of moisture and has become swampy, which is not always alkaline.

Mr. McLAUGHLIN. In most of those localities, though, the water has to be applied in the first place, does it not?

Mr. ELLIOTT. Certainly.

Mr. McLAUGHLIN. By irrigation?

Mr. ELLIOTT. It all comes from irrigation.

Mr. McLAUGHLIN. And the fault was that they were applying too much; and could not the trouble of drainage be removed if they would do proper work in irrigating?

Mr. ELLIOTT. That is the theory of our experts in irrigation. But those conditions exist. There are thousands of acres of land which are ruined in all of the old irrigated States. There are swamps sometimes as large as you frequently find here in the Middle States, and since those lands all have water rights, and are surrounded by very attractive and highly cultivated farms, it is exceedingly important that some method should be found of restoring them to their original condition of fertility, and that is what we are attempting to do, and to do it by drainage.

Mr. POLLARD. Do I understand these swamps were caused by an excess of water that was applied in irrigation?

Mr. ELLIOTT. Yes, that is the cause.

Mr. POLLARD. It looks to me, then, as it does to Mr. McLaughlin, as though if the people quit putting water on the lands, the swamps would soon disappear, would they not?

Mr. McLAUGHLIN. Does one application of water from irrigating ditches destroy the land for all time unless there is drainage?

Mr. ELLIOTT. No, sir; this is the result of the accumulation of water, of an excess of water, year after year. In some of the territory no injury appears until five years or seven years or perhaps fifteen years after irrigation is begun, depending altogether on the quantity of water and the soils irrigated and the slopes of the land and the waste that takes place.

Mr. HAWLEY. Is it not occasionally or sometimes true that the swamp is formed on one man's land while the irrigation is done on another man's land?

Mr. ELLIOTT. Yes, that is sometimes the case. These low lands simply receive the excess of water that comes from the higher land.

Mr. HAWLEY. Are you not doing some drainage investigation where there is a natural supply of water at the time when the crops are growing, simply to relieve them in the proper season?

Mr. ELLIOTT. That is in the humid regions.

The CHAIRMAN. You have told us that in the humid regions you have been busy trying to develop methods for the draining of overflowed tracts. Have you in any case actually drained at your own expense any considerable swamp area?

Mr. ELLIOTT. No; we have not done that. In the State of Utah we have taken out from our fund in some cases to encourage the farmer to put in certain drains, because he was so thoroughly discouraged that he was unwilling to venture any amount of money, and as an encouragement we have used a portion of our appropriation in assisting in the construction of experimental drains. That was done last year and the year before. But during the past year, the immediate past year, we have not done any of that, because we have shown that under proper direction and with proper methods such work is successful, and we have a sufficient number of examples to point to to show the farmers that it can be done.

The CHAIRMAN. Do the farmers in one section of the country, where one or two or half a dozen have succeeded in draining their lands in that way, go there and observe how it was done and repeat the process on their own farms, generally?

Mr. ELLIOTT. Yes; that is the object of our work, to make an example and to let others see it and enlarge upon it. That has been

the case in every instance in Utah. When that is done we simply assist by supervision and direction on the adjoining tracts.

The CHAIRMAN. I see by this map you seem to have been doing more drainage work down along by the Mississippi and Arkansas and in the State of Mississippi than anywhere else. Can you give us an idea of just what you did there and what result came from it?

Mr. ELLIOTT. That is work taken up just the last year, in which we have made surveys to determine a general plan that could be followed out in the drainage of some of those lowlands, certain sections which can be handled as units, in Arkansas and Mississippi, the object being to prepare the plans in such a way that they can be carried out by local authority under the State drainage laws. That is the extent to which we go in that kind of work, to make the surveys and plans where necessary, and assist later only by consultation as the work proceeds.

Mr. McLAUGHLIN. In no case have you done the work of draining a swamp in humid regions?

Mr. ELLIOTT. No; we never have put in a dollar in draining a swamp.

Mr. LAMB. Have you made any investigations along the low grounds of the Chickahominy?

Mr. ELLIOTT. No, we have not.

Mr. LAMB. You ought to go there.

Mr. GILHAMS. Was it not possible for the State of Arkansas and the State of Mississippi to have surveyed these lands themselves?

Mr. ELLIOTT. They claim not. They claimed they did not know how to start this proposition—those projects. They had no man that they could call upon to determine those plans in a general way.

Mr. BEALL. To what extent have they adopted the plans you have suggested?

Mr. ELLIOTT. In all cases where the plans have been completed they have organized a drainage district and are attempting to carry out the work according to those plans.

Mr. BEALL. Can you form any estimate of the amount of land that has been drained in pursuance of the plans suggested by your Department?

Mr. ELLIOTT. The drainage has not been carried out. It takes considerable time to carry out a drainage project, and we have begun these surveys only within the last year or year and a half.

Mr. HAWLEY. Did you have any connection with the drainage investigations and work in Chariton County, Mo.?

Mr. ELLIOTT. No; we have been consulted in regard to that. We have a large letter correspondence in which we give advice and examine plans and assist from the office, and sometimes by personal inspection of these grounds and plans, in order to promote the best methods of carrying them out and to avoid costly mistakes.

Mr. McLAUGHLIN. Is there anything in a drainage proposition except making a survey to find the levels and to find the outlet?

Mr. ELLIOTT. Yes, there is a good deal more than that in a drainage proposition.

Mr. McLAUGHLIN. In a humid region?

The CHAIRMAN. If the committee will permit, I believe I can give a concrete illustration of the work that has been done by this office in the way of drainage in a humid country.

Through the State of Kansas there runs a stream called the Neosho River, which has very frequent and very disastrous overflows. The State attempted to reach the difficulty, and passed laws under the provisions of which drainage districts could be formed, and the farmers could band together and issue bonds to build dikes to prevent the overflow, and many thousands of dollars were spent in that way; but the money was spent without any comprehensive survey, without taking into consideration the conditions either above or below the immediate locality, and the result was that the money was practically wasted. In some instances it was much worse than wasted, because when the water got in behind the dikes it stayed there just that much longer. This office of drainage investigations undertook to make a survey of the Neosho River Valley, and they conducted that survey from practically the headwaters of the stream to the southern limits of the State, a distance of about 200 miles.

As a result of that they presented a very sensible, practicable plan, drawn out in detail, showing the places where dikes should be built all the way along the stream, and occasionally where a little cut should be made, for instance, to let the water flow more freely, and as a result of that survey drainage associations have been organized all the way along the stream, and the people are now taking advantage of the law that the State has already passed to organize for the purpose of building the dikes where the Drainage Office has indicated they should be built; and we believe that the work can go ahead now satisfactorily because the whole area has been taken into consideration, and the people have confidence in it and think that the money they spend now will not be wasted. I take it that illustrates a great many of the cases of the work that this Office does.

Mr. ELLIOTT. There is another case, similar in character, in the Kankakee Valley of Indiana, which was mentioned a while ago. The drainage of that valley had proceeded through the upper half, the lower half of the valley in Indiana having been left as it existed originally, but the drainage of the upper part of the valley brought great quantities of water down upon the lower part and complicated matters greatly, and they were at a loss how to complete the improvement. Some were in favor of levees, and some were in favor of deepening the stream and straightening it, and some were in favor of parallel jetties, and there were various other plans, and they could not agree upon any plan.

We made investigations for two years, first taking up the general conditions which prevailed all over the valley, and what had been accomplished, and the amount of water that must be provided for, and we then made the proposition that we would locate a main channel, make an estimate of its cost, and provide a plan for the completion of the drainage system of the valley. There was a distance of about 72 miles of river which never had been improved. We actually laid out the corrected course of the stream, we reduced that 72 miles to 42 miles, we recommended the cutting of about 84 bends, we computed the size of the channel that would be required there and the cost, and made a report in detail to a committee which had the matter in charge, and they are now proceeding along that line, having adopted the course we recommended, and they are attempting to organize through those six counties for the purpose of com-

pleting the work. We go no further with that, except we hold ourselves ready to be consulted at any time upon matters relating to the perfection of the plan.

We examine problems of soil drainage, underdrainage, where the methods have in some cases failed. There is one case of that in the valley which the chairman has alluded to, the Neosho Valley, where tile drainage had been attempted and had been abandoned, and they had concluded that it would not succeed in those soils. We laid out a plan and the drains were constructed at the cost of the owner. I had a letter from the manager of the farm this morning saying that the 80 acres which were first drained under our supervision have now been extended to 300 acres. The method proposed has succeeded in so far that the owner is going on to underdrain his entire farm.

Our appropriation permits simply of the laying out and assisting in certain representative localities, with a view of getting people to construct their works properly, under our supervision, if necessary, so that the results will be satisfactory and it will become an object lesson and demonstration thereafter to those in the surrounding country.

Mr. McLAUGHLIN. You speak of representative localities. How large must a territory to be benefited be before you feel justified in going in and making a survey and a plan to be presented to the section of country interested?

Mr. ELLIOTT. How large a section?

Mr. McLAUGHLIN. Yes; or is there some other meaning of those words "representative locality?"

Mr. ELLIOTT. I mean by "representative locality" a community which can be handled as an individual drainage proposition. The drainage in our lowlands must be handled quite comprehensively. You can not drain a farm here and there. You must take in perhaps 100,000 or 50,000 or 25,000 acres. You must examine the entire watershed and determine upon a general drainage plan for the entire area. Sometimes those are quite small. They may be limited to a field in a farm, sometimes, which presents particular problems in farm drainage, or they may extend out into large areas, as they do in the deltas of the lower Mississippi Valley, where you see so many spots on the map. They all have very large problems there, and they can not handle those things as individuals; so that a part of our work consists in making such a plan and getting the people together upon it, getting them to cooperate under the provisions of the State law to carry out that work, and we generally obtain a pledge from those people that if it is found feasible and practicable to drain this land according to our recommendation they will go on and do it. If it is simply a matter of curiosity, we decline to enter that field, because we have a better use for the money.

Mr. McLAUGHLIN. Your plan may involve too much expense, though. It seems to me it would be a pretty hard matter to get the people to pledge in advance that they would carry out your plan before they know what it is going to cost them.

Mr. ELLIOTT. We put in that condition, if it is feasible and profitable according to our recommendations they pledge themselves to take up the matter and at least attempt to organize and prosecute the work.

Mr. TRUE. It is also the plan to make a preliminary survey of those regions and see whether it is worth while to do it. We have to go carefully in that way.

Mr. ELLIOTT. That is our work, making the preliminary surveys and recommending whether or not the thing is practicable and feasible. It may not always prove so, but the people want reliable information upon those points.

Mr. HAWLEY. Are there any engineers or surveyors in that work in private life who undertake the work for localities, or are you alone in the field?

Mr. ELLIOTT. Each locality where drainage starts up, as in Indiana and Illinois, develops a certain class of local drainage engineers. They, however, are not accustomed to handle large plans in a comprehensive way. They acquire the habit and practice of using levels and laying out ditches, but not of bringing to bear upon them the investigations, the scientific knowledge that others have acquired, so as to handle it most profitably.

Another part of our work, and I consider it important incidentally with this, is the development of a certain amount of knowledge that will be useful to these local drainage engineers. Drainage engineering is not upon the same established foundation as other lines of engineering. Investigations have not been carried out to determine the problems as minutely as they have in other lines, and we are sadly in need of that kind of information, and while we are carrying out these investigations we are at the same time tabulating and putting together the results and dispensing the information to these local men so that they may be guided by it.

One of the most perplexing questions in the handling of large propositions is how much water should you take off the land; how large a ditch should you provide? It is a matter of great moment, it is a matter of dollars and cents. If you make it too large it will not work so well, and it costs a great deal more; if you make it too small the land will be flooded and great loss occurs. It is an agricultural problem, a soil problem. The run-off from these various lands varies with the soil and cultivation, and the thoroughness of drainage depends upon what the land is to be used for, how intensive the farming is to be. You can not afford to put \$40 per acre drainage on some lands, but you can on others; so that in our reports we take those things into account and try to present in our recommendations the matter in such a way that the people interested can be sure of the facts and go ahead understandingly with the work. In the eastern States, in South Carolina and in North Carolina, there is great interest in the drainage of their coast lands, but they do not know much about it. They are hampered by a lack of knowledge. The eastern coast lands are now attracting a great deal of attention, and we find that there are some very fertile swamp lands in North Carolina as well as in South Carolina.

Mr. LAMB. There are some in Virginia, too.

Mr. ELLIOTT. We have just completed a survey and estimate and plan for the drainage of the Toisnot swamp in North Carolina, in Wilson county, and are about to present that report to the owners.

Mr. LEVER. Have the people around about Charleston put into execution your plans to any extent?

Mr. ELLIOTT. We made a plan for the drainage of Christ Church Parish, but they have not taken up that project yet. They have not quite completed yet the work they were engaged on in Berkeley County.

Mr. LEVER. They are following your plans, though?

Mr. ELLIOTT. Yes, sir; they have practically adopted them, and have begun constructing. Under a drainage law passed by the State last winter there is considerable interest, and Georgetown County is now desiring to take up drainage in the vicinity of Georgetown, and has repeatedly requested this office to assist them in working out the preliminary plans. We have finally consented, and a party will be started there next week to indicate to them the general plan which we shall recommend, the first one in the county under the new law.

Mr. LEVER. How long does it take one of your parties to complete a plan?

Mr. ELLIOTT. It depends very much, of course, upon the size; but we have plans in Mississippi—surveys in Mississippi just being completed—which have occupied two and three months. The survey of the Neosho Valley occupied about five months in all.

We do not publish nearly all of this work. We rely very largely upon the people carrying out the work, and the work itself being an example and speaking for itself, so we do not want to take two projects in the same locality, expecting that one well completed and carried out project will be sufficient, because work of this kind is a work that pays if it is done on fertile land and done right.

The CHAIRMAN. Have any members of the committee any further questions?

Mr. McLAUGHLIN. I do not remember how you put it, but you said if some interesting problem was presented to you, even involving the drainage of a small farm, you would take it up. How do you take that up? You have not a force so large that you can afford to send a man to a small place or a distant place. I would like to know how you do it, and how near you bring it to the people in a small place.

Mr. ELLIOTT. In some places we send a man right there. We have men to send out and investigate these things. If we can do it by correspondence we do it so, but if it is of sufficient importance to that section of the country and involves a considerable portion of land which if improved would be profitable and which would become a telling example, we send a man right there, if possible, and we may lay out the work, and in some cases superintend it.

We have just completed the survey and superintendence of a considerable underdrainage project in Crookston, Minn., on the State experimental farm, the object of that being to ascertain whether the underdrainage in that Red River Valley soil will succeed as far north as that, where the ground freezes 6 or 7 feet deep. We are cooperating with the State agricultural college and their State farm under an agreement of three years, in which they agree to keep weekly observations of certain soil wells and apparatus that we arrange there, so that we can ascertain the exact effects of that drainage upon that soil; and the same has been done at Fargo, N. Dak., with the State agricultural college there. We want to know by subsequent records and observations what is the effect of that drainage upon that kind of soil, so the results will be made public later. But the great-

est value will be to those States and to those sections which are represented by that kind of land and soil and climatic condition.

The CHAIRMAN. Do you go out and hunt up these various projects, or do you simply go where the demand comes from for you?

Mr. ELLIOTT. No; we do not go where all the demand comes from. No; we do not hunt them up. They come to us, and we have to decline a great many. We attempt to work where it seems to do the greatest good to the greatest number of people.

The CHAIRMAN. About what proportion of the \$150,000 appropriated for irrigation and drainage is used for drainage?

Mr. ELLIOTT. About half of it this year.

The CHAIRMAN. Have you anything further that you think would be of value to the committee?

Mr. ELLIOTT. I could not say anything more except to explain some of the particular phases of our work.

The CHAIRMAN. Doctor True, do you wish to present anything further?

Mr. TRUE. I do not know that I desire to say anything more about drainage, but I hoped to say something more about the nutrition work.

The CHAIRMAN. I thought we had discussed that before the noon adjournment.

Mr. TRUE. No; there has been nothing said about that.

The CHAIRMAN. I questioned you far enough to find out, I think, if you will recall, that your idea was simply to continue here in Washington the work you had done elsewhere.

Mr. TRUE. I beg your pardon. At the beginning of this afternoon we took it up in a general way, but of course I have had no opportunity of explaining the work.

The CHAIRMAN. In view of the fact that after a pretty careful consideration the committee thought best last year to cancel that item, I am very much disposed to think that they will not care to resume it now, and for that reason I doubt very much whether it would be worth while to discuss it at any length.

Mr. TRUE. Of course that is at the discretion of the committee.

At 4 o'clock p. m. the committee adjourned until Monday, February 3, 1908, at 10 o'clock a. m.

WASHINGTON, D. C., *February 6, 1908.*

The committee met this day at 10 o'clock a. m., Hon. Charles F. Scott, chairman, presiding.

The CHAIRMAN. The committee will come to order, and the clerk will call the roll.

We will take up for consideration this morning the estimates for the Office of Public Roads, page 45. I have asked Mr. Page, the director of the office, to come before the committee to answer such questions as the committee might wish to ask, and to submit any remarks that he would like to volunteer.

Mr. Page, perhaps it would be well for you to direct your attention to the paragraph on page 46 of the estimates, and explain to the committee why it is that you ask for the insertion of the new words, "Maintenance and administration," by way of a commencement.

STATEMENT OF MR. L. WALLER PAGE, DIRECTOR OF PUBLIC ROADS.

Mr. PAGE. Mr. Chairman, that change was made simply to make the terms of the bill a little more definite than they previously were. It is not a matter of any great consequence. The most important work in road improvement is the administration and the maintenance of roads, and as no mention was made of those two important points, I thought it would be well to have them inserted.

The CHAIRMAN. Just what would you expect to do after those words are inserted that you do not feel authorized to do now?

Mr. PAGE. I would not do anything different from what I do now, but my chief endeavor in this work is to instruct the people in maintaining the roads and getting the proper administration of the road units. For instance, a feature of the work that we have undertaken this year and which has met with a great deal of success, is to get a county to appoint one man in charge of the roads of the county, instead of having 100 or more supervisors.

The CHAIRMAN. That depends altogether on the local and State laws?

Mr. PAGE. Entirely. But most of our States have road supervisors for the counties. Some have done away with the supervisor system, such as Missouri, for instance, and have an engineer for every county. We try to get this system introduced, and we appoint a good engineer from the road office to visit from time to time the counties we select; first, to make a thorough study of the economic conditions—that is, to note down the location of the principal road materials. We test the qualities of these materials and report on them to the local officials. We next try to get them to use what we call a model system of road administration, with all road work under one man, who is appointed because of his knowledge of road building. We also give advice in regard to the keeping of accurate accounts of road expenditures. We find that poor accounting obtains in most sections of the country.

Last year we completed an investigation that has taken us three years. It gives the number of miles of public roads in each county, the number improved with stone and with gravel, and the rate of tax levied. We found it difficult to get these figures from the county officials. Many could not supply them. They did not know how much money they had spent on their roads in many cases. You can see very well how such conditions exist under the supervisor system. One county that I happen to know of spends \$18,000 on its roads annually under 186 road supervisors, who had the spending of that money, and the result was that they did not have a mile of improved road in the county.

If you could imagine one of our big railroads turning over the entire management to the section bosses and let each section boss buy his own rails and rolling stock and other materials and arrange his tariffs and schedules, you can imagine how that railroad would be operated. Yet this is about what most of our counties are doing.

The CHAIRMAN. Are you able to fulfill your promise to send an engineer to such counties as shall adopt your suggestions from time to time?

Mr. PAGE. We can not begin to cover the entire United States. I am keeping this project rather quiet and only advocate it in counties

where I think we can do the most good. We are not saying very much about it, because we could not possibly supply the requisite number of competent engineers to do the work.

The CHAIRMAN. When you send an engineer into a county, in compliance with the suggestions you have made to that county, what does he do?

Mr. PAGE. First of all he goes over the entire county and makes a study of the traffic on the roads; that is, which roads carry the most traffic of the county. I do not believe I am far wrong when I say that in most rural counties about 4 per cent of the roads carry about 90 per cent of the traffic. The engineer locates those roads as the ones that need the most repair and where the greatest amount of money should be expended, and then he locates the best materials and sends in samples of them to the laboratory of the road office, where tests are made to determine their quality, and then he advises from the information thus gained how and where the road funds of the county should be expended. We always advise not spending any additional money, but to see if, by introducing better methods, better results can't be obtained. Then the engineer makes a report on the whole road situation, and we advise the local authorities from the data that he obtains. If they are willing to let this one man that they appoint take charge of the roads and instruct him to follow our advice for a year or more, we will have that engineer visit the county from time to time and see how he is getting on with the work, and instruct him, first, in the best methods of constructing the roads, and next in the best methods of maintaining them. You can see how necessary it would be—if we suppose that 4 per cent of the roads carry 90 per cent of the traffic—that the proper proportion of the money available for a county's road is expended on those particular roads, and then at small cost the less important roads can be maintained by the split-log drag and the sand-clay method. Without additional cost we can often make an appreciable difference in the roads of a county.

The CHAIRMAN. You have tried this system in some counties and with good results.

Mr. PAGE. Yes; with very good results. The first experiment we made was in Los Angeles County, Cal. Some of the officials wrote to the office stating that they had the finest climate in the world, plenty of wealth, and they proposed to make the county the playground of the world. That they were contemplating the expenditure of \$3,000,000 on their roads; although they were spending a good deal of money at the present time, they were not getting good results. They asked that the Road Office would do all it could to get their work started. So I sent an engineer out, and he made just such a study of the conditions there as I have mentioned to you, and we reported to the county officials, advising what we thought was best to do under circumstances. They adopted our suggestions entirely, and at the same time made an offer of \$4,000 a year to the engineer whom we sent out, and whom we were paying \$1,600 a year. I of course advised him to accept the position. One of the most useful branches of our work is in training men to take charge of road work.

The CHAIRMAN. Can you give us an idea of about what proportion of your appropriation for the current year you will spend in that sort of instruction or administration work?

Mr. PAGE. We expended last year \$4,793.38 on it. For the next year we are asking \$11,600.

The CHAIRMAN. Do you mean to say that you are spending \$4,000 for the current fiscal year?

Mr. PAGE. Yes; \$4,793.

Mr. POLLARD. And you desire to spend how much for the next fiscal year?

Mr. PAGE. We are asking for \$11,600.

The CHAIRMAN. Have you a statement there showing the different projects upon which you have been working, and the amount of money appropriated to each during the current year?

Mr. PAGE. Yes, sir.

The CHAIRMAN. I do not mean in great detail, but classified.

Mr. PAGE. Our work, Mr. Chairman, is divided into about 23 projects, and we set aside each year a definite sum from our appropriation for each of these projects, and I have them here for the current year.

The CHAIRMAN. I will be glad to have that submitted for the use of the committee, but not to appear in the record. It will be too cumbersome for that. I think the present purpose of the committee would be reached if you will give us a general idea of what your force is doing outside of Washington. For instance, you have one consulting engineer, at \$8 per diem, when actually employed. What does that man do?

Mr. PAGE. That man goes from place to place, lecturing and giving practical advice on road building and maintenance. He is a man of very unusual ability. He is a good engineer and a good speaker, which I think is about the most difficult combination to find that I know of.

Mr. RUCKER. Suppose he should go into a new county where he is unfamiliar with the conditions of soil and climate—what would be his ability to instruct the people there with reference to road improvement?

Mr. PAGE. Of course, if the difference is very great and if he would get unusual conditions, he would have to study them himself first. But the general principles of road building apply almost everywhere.

Mr. RUCKER. That man is not able to go into a different community where he is not familiar with the conditions and instruct people at all, is he?

Mr. PAGE. I think so. The principles of road building are pretty general all over the country. For instance, I should say in California we get about the most unusual conditions. In certain sections there there are nine months of dry weather and three months of very wet weather, and of course the ordinary macadam road is not very serviceable, and it is necessary to supply some binding agent to keep the surface of the road intact.

Mr. COCKS. You mean in wet weather, or in dry weather?

Mr. PAGE. In both, but particularly in dry weather.

The CHAIRMAN. The statement here is that this man is paid \$8 per diem when actually employed. What does he do when not actually employed?

Mr. PAGE. He is at liberty to do anything that he cares to.

The CHAIRMAN. He is not retained, then, all the time by your Bureau?

Mr. PAGE. No, sir. He is a special agent of the office, or expert, and he is not in the classified service, and we employ him only when we need him. At the present time he is out in the State of Washington giving a series of lectures at the university, and he will complete these in a week or two, and then we will send him to another State where requests have been made for his services.

Mr. POLLARD. Does the university pay him for those lectures?

Mr. PAGE. No, sir; we pay him.

The CHAIRMAN. Has he any other official connection with any college or educational institution?

Mr. PAGE. As to that I do not know. We simply hire him for a specific purpose and pay him \$8 a day.

Mr. RUCKER. What proportion of the year do you keep him engaged? What part of the year?

Mr. PAGE. Last year I should say we employed him probably half the year. There is a great demand for such work, and this man has an established reputation. He is known nearly all over the country, and we are continually asked for his services.

The CHAIRMAN. Who is he?

Mr. PAGE. His name is Lancaster.

The CHAIRMAN. Does his \$8 per diem include his traveling allowance?

Mr. PAGE. No, sir.

The CHAIRMAN. You have some special agents at \$8 and \$7 a day when actually employed. What work do they do?

Mr. PAGE. Some of them are employed on one class of work and some on another. There are only a few of these special agents, but they do pretty much the same kind of work that I have just described. It is work of a special nature. One of the agents is a specialist in building sand-clay roads. It is a road that he very largely developed himself, and he has met with the greatest success in that type of road, throughout the Southern States particularly, and I think there are probably 3,000 or 4,000 miles of those roads in the Southern States which this man is largely responsible for having introduced.

Mr. LEVER. Who is he?

Mr. PAGE. Spoon is his name. He has written a very good bulletin on the subject, too. This method has succeeded so well in the South that I am going to try it in other sections of the country during the coming year.

Mr. GILHAMS. You mean a combination of sand and clay, taking the two soils and putting them together?

Mr. PAGE. Yes, sir; it is a simple method. In various sections of the South there are long stretches of sand and long stretches of clay, and one is just about as bad as the other for driving over. By this method the sand from the sand portions is mixed with the clay of the clay portion, and vice versa. After it is thoroughly wet by rain it is mixed with a harrow. The main endeavor is to get enough sand mixed with the clay so that the particles of sand will touch each other, and the clay acts simply as a matrix to the sand. It will sustain any loads of traffic and it makes a very excellent road. I remember that last year, going through Alabama, I saw 2 horses drawing from 8 to 11 bales of cotton over these sand-clay roads, and on

one road in particular I saw 11 bales of cotton being drawn by 2 horses. Four years before I was in that same place, and I saw 4 horses exerting themselves to the utmost in drawing 3 bales of cotton over that same road.

Mr. RUCKER. Three bales?

Mr. PAGE. Yes.

Mr. POLLARD. I want to ask you about this sand-clay road. I read your bulletin over two or three times. I would like to inquire as to the durability of that character of road, its lasting qualities. How does it compare with the macadam or asphalt? Is there any comparison at all?

Mr. PAGE. Of course it is designed for a different purpose.

Mr. POLLARD. I understand that.

Mr. PAGE. For a rural highway, such as we get in the principal county roads, it will withstand the traffic on such a road perfectly.

Mr. POLLARD. How long?

Mr. PAGE. It is very difficult to say. A road has got to be maintained. A macadam road, from the best information I can get in this country, to be kept in a perfect state of repair, costs about \$200 per year per mile. A sand-clay road would cost to keep it in repair a very small part of that sum. Roads ought to be kept in repair all the time. If you build a road and allow it to wear out, you have to spend a large per cent of your original cost over again.

Mr. POLLARD. If you build a macadam road, it will run three or four years without any repairs at all. Can you do that with the sand-clay road?

Mr. PAGE. Yes. The repairs would be proportionately less, I should say, if you would repair it all the time.

Mr. COCKS. Is that figure of \$200 that you give, the amount that you mean just for ordinary surfacing, or do you figure in that the picking up and putting on an inch more or two of stone? How do you arrive at the basis of \$200?

Mr. PAGE. Those figures we have gotten from the Massachusetts highway commission, who have kept a very accurate account of their repairs. They find that it averages about that, including all repairs of every kind, whether it is patchwork or refacing the road after a certain period of time.

Mr. COCKS. That opens up a question right away. Of course when you come to resurfacing a road then we have the road practically rebuilt. If that is included in the \$200 of course it makes a good deal of difference. Have you arrived at any judgment as to whether it is best to resurface the road or pick out spots with a pick and put in patches in the places where it has settled, and ruts, and so forth?

Mr. PAGE. I think the best method is to do both. The French Government has undoubtedly the best system of road maintenance in the world—

Mr. COCKS. Does not that make a good deal of difference as to whether it is a limestone road or a trap-rock road?

Mr. PAGE. Yes; but it all depends on the traffic to which it is subjected.

Mr. COCKS. We will assume, then, that it is subjected to severe traffic. What I am trying to get at is the maintenance of a trap road or a limestone road. It is quite a job to put those patches in to stay,

and the thing we are particularly interested in in my county, where we have about 400 miles of macadam road, the county being a small county, is the maintenance of those roads, and I would like to get some light on the cost and figures on that kind of repair which does not require the entire resurfacing of the road and picking up and rolling down with the roller.

Mr. PAGE. Undoubtedly the best method is to patch your roads and stop every imperfection that occurs on it right at the start, when it is noticeable. If a rut begins to form, it ought to be repaired at once, and if water settles on one place it ought to be repaired at once. If you do that it will make a great ultimate saving.

Mr. COCKS. How do you do that?

Mr. PAGE. Take a pick and pick out the place affected. Then take No. 2 stone and put enough of it on to bring it to the level of the road surface, and pound it down with a tamper and sprinkle a little stone screenings over the top, and you would not know that a patch has been made after a short time.

Mr. COCKS. Our State engineer recommends, when extensive repairs are needed, to resurface the road entirely. Our roads are subject to very heavy traffic, sometimes 400 tons, and it is almost impossible to make little patches like that stay. The heavy load crushes them out. Most of our roads are trap rock. We use very little limestone. It is too soft. It breaks all to pieces.

Mr. PAGE. May I ask what State that is?

Mr. COCKS. New York. That particular phase of the thing is more interesting to my county than anything else. Your maintenance charge would not be as high as that unless it included resurfacing. Our village maintenance is about \$100; \$50 for the first two or three years, and then it runs up to \$100. I doubt very much whether our entire cost would considerably exceed the \$200, taking it for ten years, unless you included in it the \$3,000 of original cost.

Mr. PAGE. Of course I am speaking of averages now.

Mr. COCKS. That would be unusual traffic, would it not?

Mr. PAGE. Yes. I should judge from what you say that you are getting very near the point where it is a question whether rock should be used in the construction of the road at all; whether some other form of construction is not better. You would very soon get to the point of what we call city traffic and suburban traffic, where you have got to change from macadam roads to some other form of construction, such as brick, or asphalt, or paving blocks, or something of that nature.

Mr. COCKS. In my district we have both, and the brick does not stand very much better than the macadam. Those vitrified brick are crushed and jammed all to pieces in some places. Perhaps they were not properly put in.

Mr. PAGE. Paving brick vary somewhat in different localities. But some paving brick will stand a pressure of 600,000 pounds.

Mr. COCKS. We have that tremendous weight on the top, and the intermediate material is crushed between the two hard surfaces on the top and the bottom. If we could have a foundation that was a little springy, that would yield or give a little bit without settling, and come back, you would have an ideal system. It is now too rigid.

The question would be how much to put in. Sometimes it settles unequally. As long as we can keep the surface foundation intact we are doing very well, but it is very difficult to do that.

Mr. PAGE. I see you have studied the problem. Each case like that is a problem by itself. You have to study and work out what is best to do. There is a problem before highway engineers at present; it is the most serious that I know of. It is the effect of automobiles on macadam roads. They are simply tearing our best roads to pieces.

Mr. COCKS. How does the automobile hurt the road, in your judgment?

Mr. PAGE. It is very simple. The driving wheels of these powerful machines cut them up. First, the enormous tractive force loosens the bed of the road, and what dust there is on it is thrown into the air. Now, the macadam road has been developed along lines to withstand horse traffic, and the ideal road is one where the material is so well suited to the traffic that just enough dust is worn off to cement the grosser fragments of stone together and form that smooth, impervious shell that we see on good macadam roads.

Mr. COCKS. But it does not last long.

Mr. PAGE. If the traffic is properly adjusted to the material, it does.

Mr. COCKS. You take a horse with a good heavy load and broad tires, such as we use on our market wagons, and very little injury will be done. With the automobile it is different. They disturb that surface. My theory was that the tremendous suction of the automobile drew the floor out and loosened it.

Mr. PAGE. There is a slight vacuum formed undoubtedly just beneath the wheels.

Mr. COCKS. It is said that it is not the wheel, but the body of the automobile that does that. It will raise up dust as high as the ceiling of this room, where you can not see through it, it is so thick. That is a disputed point among our road maintainers now, and it is of great interest because we have an innumerable lot of automobiles traveling over this same highway.

Mr. PAGE. Yes; and they are not going to diminish in number, no matter what the prejudice may be against them.

Mr. COCKS. Have you any data on the tar foundation or tar floor?

Mr. PAGE. Oh, yes. I have a great deal. Here is Commonwealth avenue [submitting photograph] in Newton, Mass., and this road was about as good as a road could be until the automobile came.

Mr. COCKS. The theory is that the automobile has done most of the injury?

Mr. PAGE. Yes. Not only that, but this photograph shows a slight curve in the road. In going around that curve the automobiles force the material out to the side.

Mr. COCKS. Is that limestone or trap rock?

Mr. PAGE. That is the best trap rock.

Mr. RUCKER. What do you mean by trap rock?

Mr. COCKS. I do not know. It is a very hard rock.

Mr. PAGE. It is one of the volcanic rocks.

Mr. RUCKER. I thought limestone was the hardest rock we had.

Mr. PAGE. Oh, no.

Mr. WEEKS. That photograph was taken within a quarter of a mile from my house, and the city spent half a million dollars in building

that road. Before the automobiles came it would stand about three or four years without any serious impairment. Now it does not stand a year.

The CHAIRMAN. Have you tried the oil treatment?

Mr. WEEKS. We have tried every conceivable thing, even building a cement furrow for the wheels of the automobiles to run in.

The CHAIRMAN. Kansas City, Mo., has about 50 miles of boulevard, and for the last few years they have been surfacing them with crude oil with splendid results. They tell me that by oiling their roads twice a year they maintain a perfect surface and keep them entirely free from dust.

Mr. WEEKS. The whole park system of Boston was treated in that way last year. They went over some parts of it as many as four times. It does absolutely prevent dust as long as it lasts, and it lasts pretty well, but it does not prevent the wearing of the street, and those streets have got to be resurfaced every other year to keep them in decent shape.

The CHAIRMAN. I thought if the dust could be kept down the wearing away would be prevented.

Mr. COCKS. The oil gets down into the interstices and loosens the stone, and then we have the suction of the lift up of the rubber tire on the wheel, making it easy to bring the stone out.

Mr. WEEKS. When streets are watered, if there is the least depression the water settles in that depression. One of those big wheels comes along and takes the little moisture and mud out and increases the hole at once. The next time the water settles there, there is more water there, and inside of thirty days there is a bad hole. And that is true when you apply the oil. The oil will settle a little more in one place than in another, and these big suction wheels go over it and increase that hole right away.

Mr. POLLARD. Mr. Chairman, I would like to go back to this sand-clay road question. I asked you, Mr. Page, a moment ago, about this sand-clay road, and before I finished on that they picked up the macadam question. Have you made any of these sand-clay roads except in the South?

Mr. PAGE. Not to any extent. We have a farm on the island of Marthas Vineyard, Massachusetts. Some years ago sand-clay roads were built there, and they stood very well.

Mr. POLLARD. What kind of a soil have they there?

Mr. PAGE. Rather sandy.

Mr. POLLARD. Is there any gravel in it?

Mr. PAGE. Yes; in places there is considerable gravel. We had clay fairly convenient to the road, and by putting clay on the surface and promptly mixing it it stood very well indeed.

Mr. POLLARD. Have you ever tried it in the Middle West?

Mr. PAGE. No. Strange to say, there has been very little demand through the West and North for sand-clay roads. We have taken the matter up for Minnesota. There are considerable areas there that abound in sand, and we are cooperating with the highway commission in Minnesota to try some experiments in the coming summer. The condition is so bad there that we intend to experiment with different grasses, to see if they will keep the sand in place, as there is no clay available.

Mr. POLLARD. But in my section of the country, especially in my State, Nebraska, we have the clay and sand in great abundance and easy of access, and I was wondering whether a sand-clay road there would stand. I understand the construction of a sand-clay road is mixing the sand with the clay in proper proportions so as to make a compact foundation, and that is done by what may be termed puddling. After the sand and clay are mixed in proper proportions you wait until a heavy storm comes on, and then the road is plowed up and harrowed until you make a complete mortar mixture. In our country we work our soil when it is wet, and then when it is dry it makes a terribly hard surface, but the freezing and thawing slackens that up. If a sand-clay road was constructed in our section of the country, would not our alternate freezing and thawing destroy it so that it would have to be reconstructed every year?

Mr. PAGE. No, sir; I think not. It does not at Marthas Vineyard, Massachusetts.

Mr. POLLARD. You have a different soil there; do you have gravel there. We have nothing but black-clay soil and sand.

Mr. PAGE. The material would certainly be left. It might be a little soft when the frost was coming out, but I think it would pack in a short time.

Mr. POLLARD. I would like to inquire as to the maintenance of a road built in that way. Of course, as I understand it, you have had no experience with a country where there is continuous freezing and thawing. I suppose in the South, where these roads are building, the ground never freezes. Is that right?

Mr. PAGE. Oh, no. In Virginia we built a road last year from Williamsburg to Jamestown Island, and they wanted a macadam road, and a railroad supplied the stone free of charge, and after building a short section of the road with stone we found that it was expensive and that the conditions were so good for building sand-clay roads that we gave up the macadam road and completed the road with sand and clay at very much less cost to the community, and with better results than with the rock, as the latter was of an inferior quality.

Mr. POLLARD. What kind of soil have you there?

Mr. PAGE. It is sand and clay soil.

Mr. POLLARD. There is no gravel?

Mr. PAGE. No.

Mr. GILHAMS. What is the character of the clay?

Mr. PAGE. It runs in beds of 2 or 3 feet thick.

Mr. GILHAMS. Would it be a clay that could be burned into brick and tile?

Mr. PAGE. Yes; I think so.

Mr. POLLARD. I have been looking over your project and your reports, and it seems to me that this sand-and-clay-constructed road is better for that whole section of country out there in the Middle West than any other type of road.

Mr. PAGE. That is, Nebraska?

Mr. POLLARD. Not Nebraska alone, but all that section of the country out there. The soil conditions are pretty much the same in Iowa and Kansas and Missouri and Nebraska, and Minnesota is the same excepting in parts where they have more or less gravel. All through

that belt you have much the same conditions. The macadam road is entirely out of the question in rural communities. The cost makes it prohibitive. As I understand from your report, this sand-and-clay road costs only from \$300 to \$600 per mile, and that puts it within the reach of every rural community, so far as the cost is concerned. If this is a road that will stand after it is constructed, and you have not the whole thing to make over every year, it is a plan that ought to be encouraged in that section of the country. There is nothing we need more out there than good roads; and the reason I wanted to inquire along this line was to know your idea as to the probable maintenance cost of maintaining a road such as this in my section of the country, where we have that deep black loam soil, 8 or 10 feet deep.

Mr. PAGE. Of course, I can not give you any figures, never having built such a road out there. One of the difficulties we have to contend with is that in certain sections only certain types of road are desired. In Nebraska, a few years ago, they insisted on a macadam road and we built it.

Mr. POLLARD. That road is in my district. I have been over it a number of times. Would not a sand-and-clay road have been practicable in that instance?

Mr. PAGE. I do not think it would. That road is flooded repeatedly, and we had to build a retaining wall to prevent it washing away.

Mr. POLLARD. Were you out there yourself?

Mr. PAGE. Never personally.

Mr. POLLARD. In these roads that you constructed in Virginia and places like that, where they have the freezing and thawing, what is the average cost of maintaining the road after it is put down? Have you any figures on that?

Mr. PAGE. I have not, because it is the most difficult thing to get a community with the local machinery they have at present to maintain their roads at all. It is done under no system. The supervisors scatter the work in one place and another, and the men in a large number of cases are not familiar with road building. You can not even get them to repair the roads, much less get them to keep an account of the cost of maintenance.

Mr. POLLARD. How long have you had those roads down?

Mr. PAGE. Five or six years.

Mr. POLLARD. Have any of your men been over them to ascertain the state of repair?

Mr. PAGE. Yes.

Mr. POLLARD. What are their conditions?

Mr. PAGE. In the main, good. A man once a month should drive over such a road with a load of sand and a load of clay, and if he sees any depressions he should repair them, and not wait till they become serious. This is the easiest and least expensive method of repair.

Mr. McLAUGHLIN. Do you say that is being done under your direction in some places?

Mr. PAGE. No, sir; not in maintenance. We have no jurisdiction and we simply inaugurate this work. If we are requested to give advice in maintenance, we give it gladly.

Mr. McLAUGHLIN. In any of these projects have you done more than merely suggest and advise?

Mr. PAGE. Oh, yes. We have actually supervised the work.

Mr. McLAUGHLIN. You have never purchased any of the material or paid for any of the labor?

Mr. PAGE. No, sir; only our engineers and experts have been sent.

The CHAIRMAN. Do you include in that list the road-roller operators?

Mr. PAGE. Yes; where it is our own roller.

The CHAIRMAN. Do you own a roller?

Mr. PAGE. Yes; we own 3 and rent 3.

The CHAIRMAN. Will you cite the language in the act which you think authorizes you to build roads in that way?

Mr. PAGE. Yes, sir. It was the practice of the Road Office before I took charge of it, and I think it is essential in many instances. You can not teach a person how to build a road unless you can illustrate to him with the proper implements how it is done.

The CHAIRMAN. Perhaps you will remember, although it was before you were Director of the Office, that on several successive years language was submitted expressly authorizing the Office to construct model roads, and the committee uniformly struck it out—

Mr. PAGE. Yes—

The CHAIRMAN. The committee believing that it was not good policy for the Government to enter into the actual construction of roads. What I was asking was, what language still remains in the bill which you construe as authorizing you to own road-making machinery and employ experts to operate it?

Mr. PAGE. There is an item in the bill to buy all necessary apparatus and another to furnish expert advice on road building. It is under those two items that I have obtained machinery.

The CHAIRMAN. The first appropriation here is—

To enable the Secretary of Agriculture to make inquiries in regard to systems of road management throughout the United States; to furnish expert advice on road building, maintenance and administration; to make investigations in regard to the best methods of road making, and the best kinds of road making materials in the several States; to investigate the chemical and physical character of road materials; for the employment of local and special agents, clerks, assistants, and other labor required in the city of Washington and elsewhere; for collating, digesting, reporting, and illustrating the results of such investigations and experiments.

Now do you think that the word "illustrating" used in that connection authorizes you to go out and illustrate the methods of building a good road by building it?

Mr. PAGE. No, sir. I think that "illustrating" refers to publications. It is giving expert advice on road building I refer to.

The CHAIRMAN. That is the only place where "illustrating" occurs in the act, and as you use it as one of the appropriations authorizing you to carry on the work, I thought that perhaps you used it in that sense.

Mr. PAGE. No, sir; not "illustrating."

The CHAIRMAN. The next is—

For preparing, publishing, and distributing bulletins and reports; for rent and repairs of buildings in the District of Columbia, not to exceed two thousand dollars; for necessary office fixtures and supplies, apparatus, and materials;

telegraph and telephone service, traveling, and other necessary expenses, and to enable him to assist the agricultural colleges and experiment stations in disseminating information on this subject.

You think that the use of the word "apparatus" there authorizes you to buy a road machine and operate it?

Mr. PAGE. Yes, sir. It seems to me it is the most essential piece of apparatus for carrying on road work.

Mr. LEVER. Would not the language "to furnish expert advice on road building" give you the same power to buy apparatus?

Mr. PAGE. I should judge so, but I am not versed in the law.

Mr. LEVER. It would seem to me so.

Mr. PAGE. I have consulted with the Solicitor of the Department and obtained advice on these matters always before taking any steps not previously taken, and these matters have all been passed by the Comptroller of the Treasury, too. He has to pass upon them before an expenditure is made.

The CHAIRMAN. In the natural construction of language, noticing the location of that word "apparatus" sandwiched in between office fixtures and supplies and materials, would you not consider that it referred simply to office apparatus?

Mr. PAGE. No, sir; I should not think so. I would not limit its sense to that. It seems to me the necessary apparatus for carrying on the work that is mentioned in connection with giving advice on road building is essential to the work.

The CHAIRMAN. You do not believe that "advice" in the sense in which the word is used here can be given without the ownership by the Government and actual operation of road-making machinery?

Mr. PAGE. I do not think the best advice could be. It would be useless to attempt to show a community how to build macadam roads without using the roller. It would be by an antiquated method, and they would lose money if they attempted to make their roads without a roller.

The CHAIRMAN. Can you give us cases where you have used these rollers and operators in the current year and what you have done with them?

Mr. PAGE. Yes, sir. We have built object-lesson roads at a number of places throughout the country. We built one at Sedalia, Mo. We built one in California, and we built one in Virginia, and in a number of other places. I can give the committee all of the places.

The CHAIRMAN. Now, please tell the committee just exactly what you did in the construction of those roads.

Mr. PAGE. We furnished the expert advice and supervision of the work, and where practicable and necessary we furnished such road-building machinery as we could supply.

Mr. POLLARD. What did you supply in the way of machinery?

Mr. PAGE. In some places a steam roller and rock crusher.

The CHAIRMAN. Have you any statement there showing the cost to the Government of any of these model roads?

Mr. PAGE. In my annual report I give the exact cost of every road that was built.

The CHAIRMAN. Your report did not reach us in time for this hearing, so that we are not familiar with it.

Mr. PAGE. Would you like one?

The CHAIRMAN. Yes. Just put it into the record.

Mr. PAGE. On page 8 you will see mention of the one built in the State of Washington, not far from Seattle. The work was begun in May, 1906, and finished in September, 1906. During this period 6,622 feet of roadway was graded to a width of 24 feet in cuts and 26 feet in fills, and surfaced with a 6-inch layer of macadam 15 feet wide. Besides this there was 175 feet of turnouts and approaches and bridges surfaced to a width of 14 feet, making a total of 12,044½ square yards. The soil varied from a sandy gravel to a hardpan, with a small amount of rock.

The CHAIRMAN. We do not care anything about that, Mr. Page. What we want to know is how much the Government expended in the construction of that road. You say here the total cost of the work contracted for in the lump sum was \$12,400. How much of that did your office bear?

Mr. PAGE. I regret that I can not give you the exact amount now, but I can give it to you this afternoon or to-morrow for any of our roads.

The CHAIRMAN. You can insert it at this point when you come to revise your statement.

Mr. PAGE. I can give it on every road we have constructed, if you would like it.

Mr. RUCKER. Would it not be well to insert more than one, in order to make comparisons, because the conditions might vary?

Mr. PAGE. Yes. You see, it is rather hard to get the accurate cost of a road under the conditions we build them, because an engineer can frequently supervise several of these object-lesson roads at once, and can go from place to place. It does not require his presence on the road all the time.

Mr. HEFLIN. You mean that the Government expert was in attendance on the building of this road from May to September?

Mr. PAGE. Certain of them. The road-roller operator was there as long as the road rolling was required. The engineer might have gotten through his work and gone somewhere else.

The CHAIRMAN. Was there any reason in this Seattle road, for example, why it was necessary for the Government to furnish either a roller or an operator?

Mr. PAGE. Yes. I can not recall the exact conditions under which we built this road, but, taking it in general, a request is made to the office by the local authorities having jurisdiction over a road that is to be improved, and they request such advice and assistance as we can give them; and it is on such a request as that that we gave the cooperation that I have mentioned.

The CHAIRMAN. Following the suggestion made by Judge Rucker, will you insert in the statement, when you revise it, a statement showing as near as you can show just the amount which your office has contributed toward the building of the roads that you have been connected with—the actual construction of them?

The statement referred to follows:

The cost to the Government for individual object-lesson roads varies widely, depending upon the character of the construction, the amount of work done, weather and labor conditions, and unforeseen contingencies. Furthermore, it is frequently the case that machinery and men are sent a very long distance to begin a series of object-lesson roads, and it is therefore necessary to prorate the freight charges and traveling expenses en route among the various object-lesson roads following such assignments.

As examples of cost to the Government, the macadam object-lesson road at Pendleton, Oreg., the sand-clay object-lesson road at Kenansville, N. C., and the earth object-lesson road at Wahpeton, N. Dak., are given.

These three roads involve expense for freight, but it must be understood that a number of the demonstrations of road building under the direction of this Office are made with local machinery, and therefore involve no expense to the Government for freight.

The following is the detailed statement of the expense for the three roads mentioned:

PENDLETON, OREG.—MACADAM.

| | |
|--|-----------------|
| Dimensions: | |
| Length of road..... | feet..... 2,300 |
| Width surfaced..... | do..... 14 |
| Depth of material compacted..... | inches..... 9 |
| Width graded..... | feet..... 25 |
| ===== | |
| Salaries of expert in charge and expert roller operator..... | \$422.50 |
| Traveling and subsistence expenses..... | 66.70 |
| Freight, approximately..... | 150.00 |
| ----- | |
| Total..... | 639.20 |
| Add, for salary and expenses of engineer student..... | 179.09 |

KENANSVILLE, N. C.—SAND-CLAY.

| | |
|--|-----------------|
| Dimensions: | |
| Total length of road surfaced..... | feet..... 5,800 |
| Width of surfaced road..... | do..... 20 |
| Depth of sand-clay mixture..... | inches..... 6 |
| ===== | |
| Salary of expert in charge..... | \$135.00 |
| Traveling and subsistence expenses..... | 51.57 |
| Freight..... | 22.00 |
| ----- | |
| Total..... | 208.57 |
| Add salary and expenses of engineer student..... | 151.42 |

WAHPETON, N. DAK.—EARTH ROAD.

| | |
|--|-----------------|
| Dimensions: | |
| Length..... | feet..... 5,280 |
| Width graded..... | do..... 18 |
| ===== | |
| Salary of expert..... | \$176.40 |
| Traveling and subsistence expenses..... | 26.16 |
| Freight, approximately..... | 160.00 |
| ----- | |
| Total..... | 362.56 |
| Add salary and expenses of engineer student..... | 113.60 |

Mr. PAGE. Under the first project of our work is the object-lesson road. Last year we spent \$19,953 on that work. This year we have put aside \$21,000 for that work, and we are not asking for any increase for the coming year, because I would like to say that I am not altogether favorable to the object-lesson method of instruction.

The CHAIRMAN. Mr. Page, permit me to say that, in my judgment, your Office has gone beyond the policy which the committee has been attempting to carry forward in connection with your Office. This committee has repeatedly refused to admit the construction of object-lesson roads in the language of the bill, and yet you are going ahead and building object-lesson roads. Of course I do not know what view the committee will take of the question, but I make this statement merely to give you an idea of the reason why I have been ask-

ing the questions I have asked. I wanted to bring that fact out clearly.

Mr. PAGE. But, Mr. Chairman, perhaps you will remember that I have on several occasions asked the advice of this committee whether that work should be continued, and I have never had any objection made to it. It has objected to inserting specific instructions to do the work, but it has never objected to it. I have asked the question several times, I think, in order to have it express its views on that point. If there is any doubt upon it, I would like very much to have this committee express its opinion.

The CHAIRMAN. That matter will be submitted to the committee for consideration.

Mr. HEFLIN. Mr. Chairman, I should say, unless you have the object lesson in road building, the Department could not accomplish much. I think that is one of the most important features in it. When we build a mile or a mile and a half of road in a community, that community bearing the expense and the Government furnishing the supervision and the machinery, you enable the people to become acquainted with—

Mr. COCKS. Why the machinery?

Mr. HEFLIN. Well, they may not want to go to the expense of getting it themselves—

Mr. COCKS. Ah, that is the point—

Mr. HEFLIN. And they do not know about the machinery.

The CHAIRMAN. The Road Office is getting a long way from the purpose announced when the permission was first asked. The purpose at that time, as was stated, was to furnish a sort of office here in Washington where the people out through the country could obtain information as to the best methods of building roads, and where they could have road material tested. There is a great deal of very valuable work that it has done and can do in that line. I think Mr. Page will say that the building of object-lesson roads is by no means his most important work.

Mr. PAGE. I do not consider it the most important. It is the most expensive of our work now. It varies a great deal in the results obtained. We built a short section of object-lesson road five or six years ago at the town of Jackson, Tenn., and from that short section of road that we built the people, seeing the advantage of having roads like the one we built, have since spent, I think, about \$250,000 in building macadamized roads from the town throughout Madison County, in which the town is located, and it is one of the most thriving towns in the South to-day. New manufactories have come there, farmers are moving out of other counties and going there, because they can get to town and sell their goods at any season of the year and ship produce from there at all seasons of the year. That is one case where an object-lesson road has done a very great deal of good. The city of Jackson, Tenn., is pointed out now as a model city for its roads.

The CHAIRMAN. Speaking generally, what do you think are the results that follow the construction of these model roads?

Mr. PAGE. We frequently build these roads and do just about as much good as if we had built a Washington monument, so far as duplication is concerned on the part of the people, or even attempts

to maintain them. I try to get our men to stop when they are near places where we have built these roads and see whether any more roads have been built in that neighborhood, or whether they are maintaining the one already built, and frequently they find the road which we have built going to pieces.

The CHAIRMAN. What one or more of your projects do you believe brings the best results?

Mr. PAGE. I think the one I have just mentioned, where we take nominal supervision over the county roads for a sufficient time to really build up the entire road system of the county, both administrative and in the way of maintenance and supplies. We can get a county into such shape where it can get the best results for the money expended, and I think the results in that case are more far-reaching than in any other project.

The CHAIRMAN. Do you find good results coming from lecturing?

Mr. PAGE. Yes; very good. I think in the main we get very good results from lectures.

The CHAIRMAN. Real, practical results?

Mr. PAGE. Not so practical as rather stirring up a community to the possibility of what they can do and letting them see by illustrations what other communities have done in bettering their roads.

The CHAIRMAN. Do you know whether any of your lecturers attempt to make sentiment in favor of Government construction of roads?

Mr. PAGE. Not since I have had anything to do with the Road Office. We have nothing to do with the legislative side of the work, at all. I rarely advise any community to issue bonds until they have tried to get better results with the money they are already spending, and I rather advise against bond issues.

The CHAIRMAN. You do not hold out the hope to them that the Federal Government will come to their assistance along that line?

Mr. PAGE. Never.

Mr. COOK. I would like to ask Mr. Page a question. I was not here when this discussion began. In your experimental work among the different States, I presume this has been done for the information of the people of those communities—instructions as to what the cost of construction per mile would be for good roads, and so on. Is that the purpose?

Mr. PAGE. That is one of the purposes, and also to show them how good roads should be built.

Mr. COOK. Do I understand that on these various roads that have been constructed you furnish men to supervise the work?

Mr. PAGE. Yes, sir.

Mr. COOK. Mr. Chairman, I want to say that I believe that this Bureau of Good Roads is one of the most important that this committee can consider. Fortunately for my own State, we have natural roads in Colorado, except in the mountains, that do not need much work, but I would like to see this work progress all over this country, and it seems to me that the appropriation made the last time is very, very small indeed, and I hope that this committee will encourage this work of good roads. I am very strongly in favor of it.

Mr. WEEKS. Mr. Chairman, in connection with this subject of building object-lesson roads, I would like to submit a statement that I have here about what has been done in Massachusetts. I obtained

it for my own personal information, but I think it would be of interest to the committee and perhaps to the House. The State fifteen years ago started out to build some object-lesson roads in small towns, hoping that the towns would follow the example, and not only maintain those roads, but build other roads like them, as a practical result of that. The towns did not build any roads like them, but the State found that it had to maintain the roads; that it would have to maintain the roads that it had actually built, and it has become the settled policy to build these macadamized roads to such an extent that the State is appropriating now about \$650,000 a year for building and maintaining of good roads. It will never get away from that policy. A local community itself, when it can go to the State and get the appropriation, as a matter of fact does not do anything, and the people of no local community, in my judgment, will, under such circumstances, do anything for themselves. I may have something to say on that subject later on, but I want to express the general opinion that I am opposed to appropriating money for the benefit of people who are not disposed to do something for their own interest, and especially in such a case as this, where the benefit obtained is strictly local. It is not general or interstate or in any way beneficial to people in other States or even in other local communities.

The CHAIRMAN. Without objection, the statement will be incorporated in the record.

Following is the statement referred to:

[Commonwealth of Massachusetts. Massachusetts Highway Commission, 15 Ashburton place, Boston.]

Appropriations for the construction and repair of State highways:

| | |
|---------------------------------------|--------------|
| 1894 | \$300,000.00 |
| 1895 | 400,000.00 |
| 1896 | 600,000.00 |
| 1897 | 800,000.00 |
| 1898 | 400,000.00 |
| 1899 | 500,000.00 |
| 1900 | 500,000.00 |
| 1901 | 500,000.00 |
| 1902 | 500,000.00 |
| 1903, to cover a period of five years | 2,250,000.00 |
| 1907, to cover a period of five years | 2,500,000.00 |

Appropriations for the salaries and expenses of the commission:

| | |
|------|-----------|
| 1898 | 14,300.00 |
| 1899 | 28,500.00 |
| 1900 | 28,500.00 |
| 1901 | 33,750.00 |
| 1902 | 33,750.00 |
| 1903 | 43,950.00 |
| 1904 | 39,300.00 |
| 1905 | 46,150.00 |
| 1906 | 49,514.14 |
| 1907 | 46,000.00 |

Appropriations for maintenance:

| | |
|------|------------|
| 1903 | 40,000.00 |
| 1904 | 50,000.00 |
| 1905 | 60,000.00 |
| 1906 | 64,166.66 |
| 1907 | 100,000.00 |

Mr. Cook. Could not your argument apply to all these various bureaus for which this committee is to recommend very large appropriations of money and to the experiment stations?

Mr. WEEKS. Not at all. I am absolutely in favor of experiment stations, and I am in favor of this work so far as it is advisory and so far as it is beneficial from an engineering standpoint. I would be willing to go as far as the gentleman from Colorado in anything tending to advise people how to do the work, or as to the best materials, and in a general way to educate them up to the necessities of providing for themselves. But when you go to work spending money for the actual purpose of constructing roads for them, I draw the line.

Mr. RUCKER. A very small proportion of the total appropriation is spent in the actual construction of the road. There is only somebody there to direct the supervision.

Mr. HEFLIN. To show them how to do it.

Mr. PAGE. I would like to say in regard to Mr. Weeks's objection that the Government does not build these roads in the strict sense of the word. We make the community do it. They have actually to pay all the expenses of the road except the expert advice and supervision. They spend their own money on the road, and we simply direct them how to get the best results. That is only one phase of the work that we have been discussing.

The CHAIRMAN. That is not strictly true, is it? Don't you furnish the machine and the man to operate it?

Mr. PAGE. Yes, but that is supervision.

The CHAIRMAN. Is it rather curious supervision, is it not, to go in and do the work?

Mr. PAGE. I should not say that. They even supply the oil and the waste and the fuel for the steam roller.

The CHAIRMAN. If I wanted my lawn mowed and wanted to employ you to supervise the work, would you think it necessary to come and push the machine and furnish the mower?

Mr. PAGE. If it were a complicated machine and you wanted somebody to come there and cut your lawn properly, I should think you would want somebody to operate it who knew how.

The CHAIRMAN. The word "supervision" usually means somebody standing outside and bossing and not doing the actual work ordinarily.

Mr. HEFLIN. There are other men employed under your direction while he is operating the machinery—men crushing stone and digging and so on?

Mr. PAGE. Yes. Hundreds of thousands of dollars are expended under this \$19,000 that we spent on the entire work.

The CHAIRMAN. I realize that you have an engineer there directing how the work shall be done, doing the real work of supervising. Why can he not direct an employee of the State how to run a machine just as well as he can direct an employee of the State how to drive a wagon and dump his load?

Mr. PAGE. He does it, but he would not care to send a steam roller to a community and turn it over to someone who had no experience in running it. Wherever they have one we make them furnish it.

Mr. POLLARD. Why should they not be required to furnish that just as much as the slips and horses and wagons?

Mr. PAGE. It is usual, in communities that have never had them, to teach them how to operate it.

Mr. HEFLIN. When you show them how to build a road and what machine to use in order to build it best, then you leave it with them and they buy that machine?

Mr. PAGE. No.

Mr. HEFLIN. But a machine like that? They have seen it in operation and know what can be done with it?

Mr. PAGE. Yes.

Mr. McLAUGHLIN. Do you know of any places where that has been the result?

Mr. PAGE. Yes. In a great many places that has resulted.

Mr. McLAUGHLIN. Where they have bought their own machines and continued the work?

Mr. PAGE. Yes.

Mr. GILHAMS. About what is the cost of one of these steam rolling machines?

Mr. PAGE. They vary a good deal. They would average from \$2,000 to \$3,000 apiece; about that. Of course we get them much cheaper than that.

The CHAIRMAN. The Department has not received any commission, I presume, on the machines that have been ordered as the result of their demonstration?

Mr. PAGE. I have not, sir. [Laughter.] We do not allow that. Absolute instructions have been sent out against it. We once heard of a case where that was done, but proper measures were taken at once to stop it.

Mr. POLLARD. I would like to ask you some questions further in regard to this Auburn road. It was begun before I became a Member of Congress, but I understand you went there and took a crusher and a steam roller, and you furnished an expert engineer to supervise the work and construct the road, and you also furnished a man to run the steam roller and a man to run the crusher?

Mr. PAGE. We furnished a man to operate the roller.

Mr. POLLARD. Now, you paid those two men, together with the chief engineer, did you not?

Mr. PAGE. We paid only the engineer and roller operator.

Mr. POLLARD. And the Government paid for the roller and the crusher?

Mr. PAGE. We borrowed the crusher and I think rented the roller.

Mr. POLLARD. And after you got through you sold the crusher to the Auburn Commercial Club?

Mr. PAGE. We did not sell it.

Mr. POLLARD. You purchased the machine of the factory?

Mr. PAGE. Probably what took place was that the manufacturer of the machine said that if we would let it stay there, and in that way save freight rates, he would give us a new one in its place. We were renting that particular roller, I think.

Mr. POLLARD. Do I understand, then, that the Government paid nothing for that machine?

Mr. PAGE. At that time we were renting it, I think.

Mr. POLLARD. You simply paid a rental charge?

Mr. PAGE. Yes.

Mr. POLLARD. And when the Auburn Commercial Club bought that machine, did they get a reduction on account of its being a second-hand machine?

Mr. PAGE. I could not tell you. Since that time we have bought 3 rollers outright.

Mr. POLLARD. If you will pardon me, Mr. Chairman, I would like to say that in this matter I am heartily in favor of this work being conducted, if it is carried on along proper channels. But we have had experts before us for three or four weeks, and it has been the uniform policy of the Department through all the different bureaus where demonstration work is carried on, to have the Government simply send experts and nothing more; to have the Government furnish the expert knowledge and the local communities to furnish all the machinery that is necessary for the work to be carried on, and the Government to furnish alone the experience and experts. It seems to me that rule should be followed in this Bureau, and that when a man is sent out to supervise the construction of a road, confine him to that work alone, and if a roller or crusher needs to be purchased, certainly it ought to be done by the local board or community that gets the benefit of it. If the Government agent goes in there and furnishes the machinery and the mechanics necessary to run that machinery, and when it is done moves out with that machinery, the chances are that the work will stop and the county board stop. But when the county board buys the machinery at the beginning of the work or when completed, in all probability they will carry on the work in the neighborhood, and that will not be the only piece of road construction in that section. It seems to me that ought to be the policy of this Bureau.

Mr. PAGE. I thoroughly agree with you.

Mr. HAUGEN. At first the manufacturer furnished the roller and crusher free of charge, and the railroad companies furnished the transportation?

Mr. PAGE. Yes.

Mr. HAUGEN. Why is that not done at present?

Mr. PAGE. They will not do it. They stopped lending us the rollers. In fact, I personally preferred not to borrow rollers from manufacturers. I thought it rather put the Office in a bad position, and I offered to give a nominal rental for them, so that we could have absolute control, and in the arrangement drawn up we stipulated that no sales agent should go on the ground so long as the Government officials were there. Of course we could not do anything with them afterwards. From that time they began to increase the charge of rental, until summer before last we were simply caught in such a position where we had to have rollers to carry on our work, and we found that it was cheaper to buy them, and so we bought three.

Mr. HAUGEN. The rollers are heavy, and the transportation charges are great, are they not?

Mr. PAGE. The transportation charges vary. Sometimes the railroads will let us have free transportation, but we have had instructions not to ask them for it.

Mr. HAUGEN. The object is not to advertise any roller to the disadvantage of others?

Mr. PAGE. Yes. I have instructed every roller operator and every man who goes out on work never to speak in favor of any particular make of machinery.

The CHAIRMAN. But, Mr. Page, you can not use a roller without the very fact of your using it becoming an advertisement of it. That

was the point I wanted to call attention to when I asked you in a facetious way a moment ago whether the Department had received a commission on machines sold, by reason of the object lesson. I did not mean it in earnest, but I merely wanted to call attention to the fact that the very fact of the Government's using a given machine furnishes an advertisement for that machine, and that is a reason why the Government should not do it.

Mr. PAGE. It is the best advertisement the maker could have, and I have used that point with the manufacturers over and over again in order to get a cheaper rental; but they do not see it that way, although one of them admitted that he had sold rollers at 14 places where we had built object-lesson roads.

The CHAIRMAN. Perhaps the policy of this action could be discussed to better advantage when the committee comes to consider the details of the bill.

Mr. HAUGEN. My understanding is that large sums of money are appropriated with a view to ascertain the value of various kinds of machinery and implements. Is that the case?

Mr. PAGE. You mean by the manufacturers?

Mr. HAUGEN. A large amount of money is appropriated by the Department with a view to ascertaining the value of the various kinds of machinery and implements, farming implements.

Mr. PAGE. I do not know anything about that branch of the work. We do practically nothing in that line. I have tried to get machinery from every manufacturer that I could. I have four or five different makes of steam rollers, and the operator is instructed never to prefer one make to another. I tell the operators that it sounds better for an operator to say that he would as soon run one as the other, or that each has its good features.

Mr. COOK. Is it not a fact that for the outfit to construct, say a mile of road, it would cost approximately about \$5,000, for a road machine and for a crusher and boiler to furnish the power to run that crusher? I am leading up to the question that Mr. Pollard spoke of, and I want to say now, Mr. Pollard, that it does not seem to me that any county would want to go to the expense of \$5,000 and bring in a man without experience to run a crusher or roller. Mr. Page has said it takes an experienced man to run the machine, and therefore I believe that it is perfectly right and proper for Mr. Page's bureau to make that small expenditure of money to show the people how to make good roads. Why, gentlemen, we are asked to spend millions of dollars for some of these bureaus. The Forestry Bureau asks us for \$2,000,000, which largely, so far, is an experiment; I say an experiment. What we want now is for a bureau to do something of benefit, of great benefit, to the people of this country. Therefore, I am heartily in favor of Mr. Page and his Bureau of Good Roads, and I hope everyone on this committee will agree with me.

Mr. HEFLIN. In my county, Tuscaloosa—I believe, Mr. Page, you have built an object-lesson road there?

Mr. PAGE. I think so.

Mr. HEFLIN. They advertise it in the papers and it does not only affect that particular community, but for several counties around men interested in that business will come there and see that machine working. They will come there and see the machine in operation

and the roads built, and they will talk about it and tell their friends about it, and you can get more enthusiasm developed in that way than by any amount of mere reading or talking about it.

Mr. LEVER. How long, Mr. Page, has it been the policy of your bureau to construct object-lesson roads?

Mr. PAGE. I think we have been probably doing it for six or eight years; probably more than that. It was done before I was connected with the office.

Mr. LEVER. Has there ever been any serious objection shown by this committee to that work until now?

Mr. PAGE. I have never heard any. The chairman has heard all the discussions. I remember distinctly bringing the point up when I first asked for specific authority to build object-lesson roads.

Mr. LEVER. How long has the Bureau of Public Roads been authorized?

Mr. PAGE. Since July, 1893.

Mr. COOK. How long have you been with the Good Roads Bureau?

Mr. PAGE. I have been directly with that bureau since 1905; indirectly with it since 1900.

Mr. HAUGEN. As the result of the building of these object-lesson roads, how many miles of road have been built? Do you know?

Mr. PAGE. In many cases it has not only led to the local communities building a great many miles of road, but it has indirectly led to State aid and brought about State cooperation in the building of roads.

Mr. HEFLIN. And county cooperation?

Mr. PAGE. Yes; and county cooperation.

Mr. BEALL. Have you built any of these model roads down in the black-land country of Texas, near Dallas or Waco, or near Austin?

Mr. PAGE. We have built several roads in Texas. I can not remember just where.

Mr. BEALL. Have you any knowledge of the black-land soil there?

Mr. PAGE. Yes; I have a good idea of it.

Mr. BEALL. Have you found a means of building good roads there?

Mr. PAGE. Yes. We met the same conditions in Mississippi, at Clarksdale, where they have gumbo clay. We built a road there by burning clay in place. The community could only raise \$400 at the time for this experiment, but by burning that clay we got a road at a comparatively small cost. Wood was cheap, and the road now meets every requirement of traffic, and clay is the only available material for roads in that section. That same community raised \$25,000 the following year, and spent most of it in building these burnt-clay roads.

Mr. BEALL. Have you had experience in burning that black soil there in Texas?

Mr. PAGE. Not in Texas. We built two burnt-clay roads in Mississippi last summer.

Mr. BEALL. I notice some of the railroads down there are ballasting the roads by taking some of the black soil and burning it.

Mr. PAGE. Yes; that could be done with the roads, and it would give very excellent results. We do not have to get the same high temperature in burning that the railroads do. If it is brought to a dull red heat it becomes nonplastic.

Mr. HAUGEN. Have any of these object-lesson roads been built in Iowa and Minnesota or any of those prairie States?

Mr. PAGE. Yes; we have built them in nearly all the States.

Mr. HAUGEN. What kind of road do you consider the most practical and lasting?

Mr. PAGE. I have always recommended a road to suit the traffic that goes over it. We are often asked to build macadam roads when a macadam road is not necessary and where the community can not afford them. In many cases where macadam roads are desired the proper use of a split-log drag on the roads fulfills all the requirements.

Mr. HAUGEN. And would you build a road, for instance, where there are neither logs nor rocks?

Mr. PAGE. If there are 400 or 500 vehicles daily passing over a road it would probably be more economical to macadamize it.

Mr. HAUGEN. How much do they cost per mile?

Mr. PAGE. They vary from \$1,500 a mile up to \$10,000 or \$12,000. Some say they can build them for as low as \$1,500 a mile. It depends largely on the width, depth, the availability of material, and the cost of labor. It is a good deal like building a house.

Mr. HAUGEN. In localities where the materials are scarce, as well as rock, the expense would be greater?

Mr. PAGE. Yes.

Mr. HAUGEN. Is it not a fact that the clay and gravel road is far superior to the macadamized road more than half the year?

Mr. PAGE. Where the best gravel can be found you frequently get a road just as good as a macadamized road and much cheaper.

Mr. HAUGEN. And a clay road, where it is properly drained?

Mr. PAGE. For light travel you can get just as good a road with gravel, if you can get good gravel.

Mr. HAUGEN. I mean the average roads of the country.

Mr. PAGE. Yes.

Mr. COOK. When you first stated you had built experimental roads in nearly all of the States you did not mean to include Colorado? [Laughter.]

Mr. PAGE. No, sir; we have not built a road in Colorado.

Mr. COOK. You mean the United States and Colorado. [Laughter.]

Mr. HEFLIN. The Almighty built them.

Mr. COOK. I do not change my views, however, Mr. Chairman, as being deeply interested in the building of good roads for the people of the whole country.

The CHAIRMAN. We are all deeply interested in the making of good roads; but touching the details of policy in that regard, we can take them into consideration later among ourselves.

Now, I want to ask you, Mr. Page, why the words "District of Columbia" are inserted in the bill in connection with the item of rent and repairs of buildings?

Mr. PAGE. I may say, Mr. Chairman, that it is the first time I have seen it.

The CHAIRMAN. Do you rent buildings anywhere outside of the District of Columbia?

Mr. PAGE. No, sir. We only rent one building.

The CHAIRMAN. I presume that was put in, then, at the suggestion of the Comptroller?

Mr. PAGE. Perhaps it was the policy suggested by the Department. It is the first time I have seen it.

Mr. WEEKS. May I suggest, Mr. Chairman, that Mr. Page give in detail the expenditure on one of these roads, like that one near Seattle, in Washington, \$12,700, and we can determine from that probably how much of the amount has been expended by the communities, and how much by the Government.

The CHAIRMAN. I thought Mr. Page would be able to present a statement showing very accurately, or at least approximately, what the Government had expended on each of these roads. That is the only point you had in mind, was it?

Mr. WEEKS. Yes.

The CHAIRMAN. Gentlemen, Mrs. Abel, of Baltimore, is present, coming with a letter of introduction from Mr. Bonaparte, the Attorney-General, and she has asked to be heard by the committee for a few minutes in regard to the nutrition work that was formerly carried on in Connecticut, the appropriation for which was stricken out of the bill last year. Without objection, the committee will hear Mrs. Abel.

COMMITTEE ON AGRICULTURE,
HOUSE OF REPRESENTATIVES,
Tuesday, January 21, 1908.

The committee met at 10 o'clock a. m.; Hon. Charles F. Scott (chairman) in the chair.

The CHAIRMAN. I learned yesterday that the executive committee of the American Association of Agricultural Colleges and Experiment Stations was holding a meeting in this city, and I took the liberty of inviting them to come before the committee this morning. This committee consists of Dr. H. P. White, of the Georgia College, Dr. W. E. Stone, of Indiana, Dr. J. S. Snyder, of Michigan, and Dr. C. G. Curtis, of Iowa. Doctor White is the chairman of this committee, and I am sure the committee will be very glad to hear whatever he may wish to say in regard to the relations that do exist between the agricultural colleges and the Department, or that should exist between them, which are supposed to be the same, and Doctor White has told me also that he would be very glad to respond to any suggestions or inquiries that the members of the committee may wish to make.

**STATEMENT OF MR. H. P. WHITE, OF THE GEORGIA AGRICULTURAL
AND MECHANICAL COLLEGE.**

Mr. WHITE. Mr. Chairman and gentlemen, we greatly appreciate the courtesy of this committee in permitting us to occupy a few moments of your time this morning. After correspondence and on conference with your distinguished chairman, we thought that maybe it might not be without value if you gentlemen who represent the interests of agriculture, and the great legislature of the United States, should know from us who represent the great colleges of agriculture and the experiment stations dealing with research in agriculture, what, in brief, we are endeavoring to do throughout the United States, and in what manner our work is related to that of the great Federal Department of Agriculture here in the city of Wash-

ington. Of course I will not take your time to detail the history of the foundation of these institutions. Briefly they came into existence through legislative enactments of the Congress of the United States.

In 1862 a bill was introduced by Senator Morrill, of Vermont, with which you are no doubt all familiar, which distributed public lands of the United States in proportion to the population of the States, and from the proceeds of the sale of those lands institutions of agriculture and the mechanic arts were established. The States have also furnished money for these institutions, and at this time the revenues derived from the States are greater than the revenues derived from the General Government. The General Government supplemented the general act of 1862 in 1890 and again last year, in 1907, by making lump-sum appropriations, annual appropriations, for the benefit of these institutions. As a department of each of these institutions the Federal Government was moved in 1887 to establish a department of research—agricultural experiment stations—in each State and attach one to each of the colleges in the several States.

In 1906, at the instigation of Mr. Adams, of Wisconsin, who introduced the bill, the appropriations to those institutions were supplemented, until now they each receive \$30,000 annually from the Federal Treasury. The States have in like manner supplemented their appropriations, so that we have now, instead of institutions of instruction in agriculture and the mechanic arts, institutions doing research work in agriculture, supported in part from appropriations from the Treasury of the United States and in part from appropriations made from the States. That is the situation, Mr. Chairman.

The CHAIRMAN. You have overlooked, I believe, the Nelson amendment to the agricultural bill of last year.

Mr. WHITE. I thought I mentioned that last year, 1907, there was an additional appropriation. If I did not, I should have done so. The first appropriation for the colleges, in 1862, was the distribution of lands. In 1890 there was an appropriation of \$25,000 annually for each State from the Treasury. In 1907 that was increased. It was a progressive appropriation which was made by the Nelson amendment. It was increased to \$25,000 more, so that each State now receives, or will in a year or two receive, \$50,000 annually from the Government—from the National Treasury. Then, besides, they have whatever revenue is derived from the money invested which was obtained from the sale of the lands in 1862. Each of the States has \$30,000 from the General Government, and then, besides, the total revenues of the colleges and stations amount to millions of dollars annually. They educate 40,000 or 50,000 students. They employ staffs of instructors and research men amounting to 3,000 or 4,000. So that we have here, as I say, a great establishment for industrial education and industrial research. That establishment, that network of institutions, is of course closely affiliated with the Department of Agriculture, the interests of which are given specifically in charge of you gentlemen of this committee.

We thought, therefore, that it might not be improper, when you have under consideration the interests of this great Department, that you might know something of our connection therewith. We are brought immediately in contact with the Department through

one division of it, the Office of Experiment Stations, and of course we come in contact immediately with that office. We should be glad, therefore, if you gentlemen in considering the needs of the Department would, when you come to that part of the appropriation bill, or that part of the consideration of the interests of the great Department, remember that that office is the office that comes immediately in contact with these colleges and stations. Anything you can do, therefore, in your wisdom, to aid that particular office so that it may serve as what we sometimes call a clearing house for the colleges and the stations, that is to say, furnish us with information as to what is being done in the several States and in foreign countries in the way of industrial education, what is being done in a general way in research as applied to agriculture, will benefit the colleges and stations. We look to the Department and to that office particularly for this kind of information. Of course that involves, I fancy, the expenditure of some considerable sum of money; I have not in mind just now how much, nor is it essential that we should know just now. All we wish to do is to tell you gentlemen that the associations of the colleges and stations with that particular Office of Experiment Stations have been thoroughly sympathetic in the past; we are under many obligations to the office, to its Director, and to the Secretary, and to the Assistant Secretary of Agriculture, for a vast deal of useful work, giving us information which would be perhaps impossible, certainly very difficult, for the individual colleges and stations to acquire. Therefore we would beg that when you come to consider the Office of Experiment Stations you be good enough to bear this in mind, and to understand that back of that office stands the sympathy, I believe unanimously, of the colleges and stations in the work which they are trying to do; clerical work, clearing-house work, particularly.

That industrial education, agricultural education, may be efficient, it was recognized long ago that a great deal was required to be known, more than has been known, and that led to the establishment of the research departments at these experiment stations. Their purpose is, of course, to investigate, to ascertain new truth. That calls, of course, for a vast deal of genuine scientific work, field work, and laboratory work, and work of all characters, work concerning which you have been told by the gentlemen of great distinction who occupy the research bureaus of the Department of Agriculture. The work is not restricted to home; they must go abroad. Of course we obtain in the colleges the advantages of that work, and we undertake to carry on some part of that work. The stations more particularly, of course, concern themselves with investigations of what might be called local character. At the same time they can not be restricted to that, because there are certain problems which in the nature of things can not be strictly local; they overlap. In that work we also have felt very sympathetically toward the research work of the Department of Agriculture. We appreciate its value. We are thoroughly cognizant of its high standing and high character, and we would therefore be very glad if you gentlemen who represent the National Legislature could feel that you could give your support to those great research departments in the Department of Agriculture, as well as to the Office of Experiment Stations, of which I have spoken particularly.

We have nothing to ask specifically for the colleges and stations themselves. As your chairman has kindly expressed it, we do not appear of our own motion to advocate any particular bill or anything of that sort. We simply wanted you gentlemen to know that we are—and there are a great many of us—in a certain sense a permanent part of the Government organization. Some of us have been in the work for very many years, and some of us hope to continue in the work for a good many other years. We are trying our best to educate the youth of the country, to make them efficient in industrial pursuits. We are trying to make good men and good citizens, and good women, too, because many of our institutions are coeducational. We have to deal not only with the needs of the farm, but with the needs of the home. In our institutions we are developing courses in domestic science to a greater degree, and to a greater degree of acceptability, than in any other class of institutions, perhaps, in any country of the world. We need our research departments, of course, for several reasons. First of all, we need the research departments at our experiment stations, and we should be glad to see this work extended, not only on strictly agricultural lines of investigation, but we should be glad to see some similar department in each institution to develop domestic science, the science of cookery, the science of the home, the science of the making of a home. Those are matters in which we have no means for reaching the sum of knowledge. There are a great many things to be learned that can be learned only by investigation. These things can be learned only by research.

The great resources of the States in mining, which is related to agriculture, of course, and in forestry, need investigation. We should be very glad if some day we should have research departments connected with the colleges, looking after all these great industries of the United States, more particularly to advance knowledge and add to knowledge concerning them, and put that knowledge in such shape, in pedagogic form, that we may use it in our teaching work. As I say, we have nothing particularly to suggest to you gentlemen, except we think you ought to know just what is being done in the nation to-day in this matter of industrial education by these colleges of agriculture, what is being done in the way of investigation through our colleges and our stations, and we will receive, I am sure, a sympathetic attitude toward the work in which we are engaged.

The matter will come immediately before you, because as I have said we are intimately in touch with the great Department of Agriculture here. Sometimes questions arise, nothing serious, nothing that need be serious, because that is a matter of personal equation largely, and can be determined by sitting down and talking the matter over, as to how far the Department's work should overlap the work of the several stations of the several States. We do not consider that as a very material thing. We would not wish to be hampered in any way in the work in the States by any regulations of the Department, and I am sure the Department itself would not so wish—by regulations which would take from us in the States a certain degree of liberty of action; because we regard the inspiration that comes from what we teachers sometimes call academic freedom as of very great value, and, therefore, of course we want to encourage our men who are teaching and investigating, and we want to encourage

them and let them have individual ambitions, and let them feel free, that they are free to work out their own salvation on scientific and pedagogic lines, and therefore we would not be hampered by any great machinery of regulations, or anything of that sort, which would make the stations, as it were, subsidiary departments of the great Department of Agriculture; nor does the Department of Agriculture so wish, nor indeed has it so acted.

Sometimes in special lines questions arise, and we endeavor to handle them so as to avoid any possible friction, for there need be none. For example, about eighteen months ago we created in our association a committee of investigation of methods of scientific research. One member of that committee is a member of the Department of Agriculture, Mr. Gifford Pinchot, and we have Dr. Starr Jordan, of the Leland Stanford Junior University, and Mr. Carroll D. Wright, and two of our own men, Doctor ———, of New York, and Doctor Armsby, of Pennsylvania, and they are trying to see how we can all work together to the best advantage and to make our work most efficient. Now, to be specific, we should be very glad if you would consider, as I say, sympathetically, the work of the Office of Experiment Stations. Doctor True will appear before you at your convenience and state to you what is being done, and we wanted to say to you that we would be very glad indeed to see that Office given all reasonable means to do the work, which we consider, from our point of view, of extreme value. They help us immensely. There is one line of research in that Office—I do not know that logically it belongs there, but as a matter of fact it is there—investigations of human nutrition.

Now, that is one matter that will engage the attention of you gentlemen. Those investigations have been carried on in this country on a very small scale, and we should be very glad to see that continued. I understand that the Secretary feels so, and while we are not advocating any particular appropriation or anything of that sort, we want to say that for our uses, our purposes, and our institutions we need a great deal of information about the uses of foods, and so on, that can be supplied to us through investigations of that sort, and which are not now in the possession of humanity; and as that is a general proposition, perhaps it might be best that it should be conducted by a central department like that of Agriculture, at Washington. Of course, now, that touches agriculture. Take as an illustration, for example, the utilities of breakfast foods. Investigations must be had to determine whether they are preferable to our ordinary wheats, and if so, the agriculturist must be led to sow his wheat, and garner the wheat, and prepare his wheat to get the best nutritious value out of it. There is the question of whether we should all take to eating nuts and fruits, which is one that affects the interests of the great meat industry of the country, and we can not determine that question without very careful investigation.

The CHAIRMAN. Will you permit me to inquire whether or not, as a matter of fact, that would not be an individual problem, on the theory that one man's meat is another man's poison?

Mr. WHITE. So it might be that investigation would determine that very fact, and that would be a very important fact to have determined. Of course, you understand what I mean, that those things ought to be subjected to scientific inquiry, as they are so

expensive and take so much time that it is not frequently that individual effort would be directed along that line. At any rate, in this country we have come to know that coordination of forces and concentration of effort have already accomplished a vast deal. I think, for example, that in the United States—and Doctor Galloway is thoroughly informed on all those points and will agree with me—perhaps scientific research in agriculture has progressed further than in any country of the world.

Mr. GALLOWAY. That is true.

Mr. WHITE. That has unquestionably been true because we have had an organization, with a college in each State and the Agricultural Department in Washington, and we have gotten people to work together and sympathize with each other and to eliminate those things that do not seem to be promising and concentrate effort on matters that do seem to be promising. It has been so successful, and the results have been so useful in the past, that we rather think that in these other matters that have not yet received much of our attention it might be equally valuable.

I do not know that I have anything more to say. We really thank you very much for your courtesy. Of course we are ready to respond to any inquiries.

The CHAIRMAN. I should like to inquire whether you have discovered in any of the States a tendency to limit State appropriations to your institutions since and on account of the passage of the Adams Act and the Nelson amendment?

Mr. WHITE. Of course it would be right difficult to say dogmatically that, because one does not always know what is back of State action. This is true, however: Since the passage of the Adams Act I do not know that the appropriations from the States have materially increased, but I do know that from the establishment of the original stations the contributions of the States to the stations exceed those of the United States Government. In other words, the Federal Treasury contributes something like \$725,000, I think, to the stations, or \$700,000, and the States appropriate very much more. Whether the increase in the State appropriations has been material since the Adams Act I am not prepared to say. It has been in some cases increased, and in some cases not.

The CHAIRMAN. You will understand, of course, what I was trying to bring out was whether State legislatures had used the generosity of the Federal Government to excuse themselves from appropriations that they would otherwise have made.

Mr. WHITE. As a general proposition, I think not. In the first place, so far as I know, no State has decreased its appropriation for purposes of this sort because of the passage of the Adams Act. Some of them have increased their appropriations since that time, but whether it was because of the Adams Act I can not say.

Mr. POLLARD. Do you know whether there are any of the States that do not appropriate as much money for their stations as they receive from the Federal Government?

Mr. WHITE. Oh, yes; there are several of the States which do not appropriate as much money to their experiment stations as they get from the Federal Government.

Mr. POLLARD. Can you give us the name of those States?

Mr. WHITE. No, sir; I can not give you the names of all of them. I can give you the name of one; that is Georgia, unfortunately, of which I am a resident.

Mr. HAWLEY. Is it not true that the charge for buildings is a charge upon the State rather than upon the United States Government, and that that may account for the apparent lack of support in the operating expenses?

Mr. WHITE. Of course the States, whether it appears in the budget or not, furnish certain lands and buildings, and they furnish the maintenance of the lands and buildings, and sometimes that is provided indirectly. In our own State it comes indirectly through university appropriation. It is not a direct appropriation from the State. This is true, however, that it is very difficult to draw any general conclusion. All over the country at the present time, I suppose in the last twenty-four months to a greater extent than ever before in our history, there has been an immense interest developed in agricultural legislation. Now, agricultural research must go hand and hand with agricultural education.

The CHAIRMAN. In that respect I wanted to inquire whether you had noticed recently a decided movement in the direction of agricultural courses in the primary and secondary schools, and I understand you to say that you have?

Mr. WHITE. Unquestionably.

The CHAIRMAN. That being true, are your colleges equipped to advise the boards of education in the various school districts as to the course they should establish?

Mr. WHITE. We think so. We think we are perhaps better able to advise than any other institution or group of institutions, and for this reason: For a great many years—some ten or twelve years now—this association which our committee represents has had a standing committee on what is known as instruction in agriculture. They have endeavored to beat out some practical method of teaching agriculture in the colleges and in the schools. I happen to have here, for instance, in my hand the last bulletin issued by the Office of Experiment Stations, which embodies the results of the work of that committee in secondary courses of agronomy. We have been trying to do that, and I think we have been more successful in that than any other country in the world, and of course the results are applicable in the schools.

The CHAIRMAN. Then any county or district in Georgia which wished to include agriculture in its school course could apply to you and get a concrete suggestion that would meet their wants?

Mr. WHITE. Undoubtedly; they should be able to do so. Of course we would not go so far as to say that our suggestions would be final, because we are not sure of them. We do not know that we have yet reached the best forms for teaching agriculture.

The CHAIRMAN. But you have, and could give to them, as good advice as they could get anywhere else in the United States?

Mr. WHITE. Yes, considering the local interests, better. As I say, this committee has cooperated with all the States of the United States, and we use this office of experiment stations as our clearing house. They issue the bulletins and print them and distribute them all over the States. I can speak for my own State, of course, Georgia, and that bears upon the other question you asked. The interest in

agricultural legislation and agricultural research has been growing rapidly the country over in the last few years. Now, when people get interested, sometimes the leaders want to break away in lines of their own. In our State, for instance, after we had cultivated a very decided intelligent interest in this matter of industrial education and industrial research, it took the form of an attempt to spread that kind of education and research throughout the State, and while the people made through their legislature an appropriation to the college, for instance, gave us a lump sum of \$100,000, which in Georgia is a right large amount of money to give in one year, at the same time they established agricultural schools in each Congressional district, and provided for their maintenance out of the public treasury, at the same time calling upon the communities to provide the lands and buildings. It was a great delight for us to know that \$1,000,000 was taken out of the pockets of the people by private subscription to establish those schools.

The CHAIRMAN. Would you mind telling the committee what the results of that experiment have been? Are those schools regarded as successful and helpful to the communities?

Mr. WHITE. Of course; unquestionably. Of course they are just established.

The CHAIRMAN. How long since were they established?

Mr. WHITE. They opened their doors, those that have opened up, on the 1st day of January of this year. Of course there are always delays about that sort of thing; we were undertaking to establish eleven at one time. There are difficulties about teachers, of course, and some of the subscriptions were not promptly paid, and all that sort of thing, but they have all been established fairly well. There were some legal questions about land titles, but I think six of them are in actual operation today, and my latest information is that they are all crowded to the doors with pupils.

Mr. LEVER. Taking the \$100,000 appropriation made for these Congressional schools, as we will call them, and concentrating that at your central experiment station, will you give your opinion as to the comparative efficiency of the work that would be done under those two systems?

Mr. WHITE. You understand an appropriation of \$100,000 was made to the college.

Mr. LEVER. Yes, I understand.

Mr. WHITE. And then an additional appropriation was made for these schools.

Mr. LEVER. Take the additional appropriation made to these schools and concentrate it at the central experiment station, what is your opinion as to the result of that as compared with the result of the present arrangement?

Mr. WHITE. Of course concentration of effort is the most efficient way of doing work, but at the same time even nature does not work that way. Nature is wasteful.

The CHAIRMAN. Nature's resources are rather large.

Mr. WHITE. Nature's resources are unlimited, and her methods are very wasteful, and some of us think sometimes that their resources are unlimited, and they become wasteful. What I mean is this: If we could round up the whole population of Georgia and make them do what we want them to, I think we could more efficiently educate

them by having all moneys concentrated in one place. At the same time you would lose all this life and interest and ambition, and while that involves some waste, at the same time it has its merit. We think it was a good thing to establish these eleven district schools.

Mr. POLLARD. What relation do they bear to your central station?

Mr. WHITE. In Georgia we have but one central institution of higher learning known to the law, and that is the State University.

Mr. HAWLEY. Will it tend to decrease the interest in your central institution?

Mr. WHITE. I do not think so.

Mr. HAWLEY. And it will increase the number of those taking the course?

Mr. WHITE. Yes, sir; and in the end it will increase the number of those institutions.

Mr. LEVER. These institutions are preparatory institutions to your higher institutions?

Mr. WHITE. Yes, sir.

Mr. LEVER. Do you have any difficulty in providing these schools with first-class teachers?

Mr. WHITE. Yes, sir; that is the difficulty.

Mr. LEVER. Suppose all the States of the Union should adopt this Georgia plan, what would you say as to the possibility of getting first-class men for those institutions?

Mr. WHITE. Of course I could only answer that in a general way, but I fancy that there would be some difficulty.

Mr. LEVER. How serious would that be?

Mr. WHITE. Quite serious, I fancy. Of course that would cure itself in a very short while, because the moment these positions were offered and a career was brought before the young men or young women in that way, they would fit themselves for it. Professor Snyder can tell you about Michigan, and I believe I heard you say yesterday that you could supply enough teachers for Congressional schools immediately, Doctor Snyder?

Mr. SNYDER. We could; but if you will allow me to interject, we do not want Congressional schools. We have 500 high schools in the State that will do that work and will furnish the agricultural education to ten times as many children.

Mr. WHITE. That is true; there is no doubt about it, and personally I sympathize with that view. I would much prefer taking a good teacher and having him teach agriculture in existing high schools than to establish high schools for the express purpose of teaching agriculture.

Mr. HAWLEY. Do you have a special course in your college to prepare teachers for teaching in these schools?

Mr. WHITE. We have had, and are now extending that. One of the amendments of the Nelson Act was permissive, to employ teachers for some of these schools. Of course we are going to do it. Of course that is something that must grow very slowly. It is very difficult to get a good teacher, more particularly for what you might call elementary agriculture, and we have got to train them and train the best we can. Of course it costs money to do it.

Mr. HAWLEY. Do you think that the elementary schools can be worked successfully without small experiments in connection with the schools?

Mr. WHITE. That is what you might call demonstration or illustration, more than experiment. Experiment in that sense, yes. Of course we always use what we call the laboratory method. Of course that is just as essential in agriculture as it is in any other teaching. We have the school gardens, and all that work, and all those things we are trying to develop in the lower schools as well as in the central college or university.

Mr. COCKS. Do you think it would be a fair proposition for the Government to withhold its appropriation from any State that did not give a like sum?

Mr. WHITE. I would not consider it fair, sir, if you ask me the question, for the reason that that would be rather harsh usage. In the first place, as a general thing it is not well to make a gift with a string tied to it. Take our own State. I am very glad that I represent Georgia for a great many other reasons, but in this connection because we were one of the poor States of the war of the South that came out of the civil war with nothing, and we have been obliged to rebuild our civilization and build up all our institutions over again, and if Georgia had not been a beneficiary of the Morrill Act and subsequent enactments we would have had no vestige of standing in agricultural instruction in the State to-day.

Mr. COCKS. While that may be true then, how about it now?

Mr. WHITE. I think that might be true now.

Mr. COCKS. I am talking about now.

Mr. WHITE. Now, there may be some other States in the South; some of the southwestern States——

Mr. COCKS. Texas, for instance.

Mr. WHITE. No; nor New York; no. I do not know. But I was just speaking of the question generally, now. I know this, that a Federal appropriation of that sort or an appropriation of that sort which builds up a good thing within the State will after a while commend itself to the judgment of the people. Now, it would be a vast pity for the prosperity of the State if that should be removed from the State because of the inability or indisposition of a present legislature to do its duty.

Mr. COCKS. How long do you think that ought to be kept up? We have kept it up for twenty-five years. Is it not your opinion that the States should come forward with something?

Mr. WHITE. Is it not true that the States have responded, as a whole?

Mr. COCKS. Yes; but some have done very little to help.

Mr. WHITE. Of course that is a question of public policy.

Mr. COCKS. We have to take the whole thing into consideration.

Mr. WHITE. Yes; that is true.

Mr. HAUGEN. Nearly half of the States have failed to respond.

Mr. WHITE. Oh, a vast majority of them; in fact, almost all.

Mr. HAUGEN. Have failed to respond?

Mr. WHITE. No; none have failed to respond.

Mr. HAUGEN. I had reference to the direct appropriation.

Mr. WHITE. None of the States have failed to respond.

Mr. HAUGEN. With direct appropriations?

Mr. WHITE. Their direct appropriation sometimes is not equal to that of the Federal Government.

Mr. SNYDER. It may be that they have not assisted directly; their assistance may be in the way of buildings and lands.

Mr. WHITE. Of course I am not speaking by the card.² There may not be any stated annual appropriation, that is true, which finds its way specifically to this college, but I think that I am certainly within the truth when I say that no State has failed to respond in some measure in some way.

Mr. COCKS. We mean officially—by act of legislature—not by individuals.

Mr. WHITE. Certainly.

Mr. COCKS. I may be under a misapprehension, but it was my idea that many of them had not responded.

Mr. WHITE. Were you speaking of the stations or the colleges?

Mr. COCKS. No; either stations or colleges; either one.

Mr. POLLARD. I understand, Doctor, that you are the president of the association of experiment stations of the various States. Is that correct?

Mr. WHITE. I am not the president of the association. There sits the president of the association, Doctor Snyder. I happen to be president of the executive committee, to which is intrusted all the details of the work.

Mr. POLLARD. You have an association that is made up of the presidents, I suppose, or the superintendents, of the various experiment stations?

Mr. WHITE. And colleges.

Mr. POLLARD. Yes. I gathered from your remarks this idea, that it was the view of these experiment stations that it was the province of the Federal Government to make these individual researches along various lines in agriculture, seeking new information, endeavoring to discover new plants to be introduced into the various sections of the country, and to discover remedies for controlling pests that are attacking the plant and animal life through the country. That is all very good. I would like to know what these experiment stations are doing in the way of carrying this information which this Department here has gathered to the people in the various States that your institutions are located in.

Mr. WHITE. They are doing an immense deal.

Mr. POLLARD. I would like for you to be specific, if you can, aside from your instruction, as to what you are doing. Of course I understand you all have an agricultural school where you are teaching the young men and women the science of agriculture, but what are you doing aside from that toward introducing these new plants or new remedies that have been advanced and have proven to be absolutely successful, and in the eradication of diseases of animal and plant life?

Mr. WHITE. I can answer specifically, but of course it must be briefly. In the first place, the stations print bulletins that are issued freely through the mails to anybody who asks for them; and we are very careful to have them ask for them. In the second place, I can not say every college, although I think it is true that every college and every station together have what is known as extension work, farmers' institutes, speeches to the people through their agricultural societies. The principal speakers we have at those meetings are the officers of the colleges and experiment stations, supplemented of course by the valuable services of these gentlemen

from Washington very frequently, and that is the way we are endeavoring to take home to the people what we learn, even more than with our farmers' bulletins. The newspapers of the States are kind about it, and they are very anxious and willing to print anything written from these stations and from the colleges. There is an immense propaganda.

Mr. POLLARD. Are the people taking up these methods that you are disseminating?

Mr. WHITE. We think so: We should be very sorry to think otherwise.

Mr. POLLARD. Are you accomplishing results?

Mr. WHITE. We think so. Let me give you an illustration. We held a cotton school at our institution, a ten days' cotton school, beginning the 1st day of January. The object of that school was simply to study cotton. We had 110 farmers to come there to spend ten days to study cotton. We printed everything we could find about cotton, and abundantly, and gave copies to these men to take home to distribute to their neighbors to give them the best that we could discover about the cultivation and care and raising of cotton.

Mr. POLLARD. Did it help them?

Mr. WHITE. We think so.

Mr. POLLARD. You think so?

Mr. WHITE. Yes, sir.

Mr. POLLARD. You do not know?

Mr. WHITE. Except that the agricultural progress of the country shows that there has been very great improvement in agricultural methods.

Mr. POLLARD. The reason I asked that question and led up to it in the way I did is this: I think the theory that you have advanced is correct, speaking of my own view only, and I should like to see that plan worked out, but we are brought face to face with this proposition on this committee to-day in regard to your section of the country. The Government—this Department—is sending experts from Washington, who are teaching your people, for instance, how to control the cotton boll weevil, and how to improve their methods of cultivating cotton, and so on, and in addition to that we appropriated last year, I think, something like \$150,000, which is to be used by the Federal Government in the extermination of the cattle tick and Texas fever, and we have spent lots of money up in Massachusetts in the control of the gypsy moth. The Government is doing this. Now, the Government here in Washington has worked out these problems and we have furnished a solution, and yet the States are coming here and demanding that we shall not only furnish the information but go ahead and prosecute the work and carry it into force. It seems to me, for instance, in matters like that of the gypsy moth and Texas fever and these other matters that were brought out here, these stations ought to take them up and the State ought to prosecute that work, after we have furnished the information. I would like to know what they are doing along that line.

Mr. WHITE. I quite agree with you, and I will go a little further. Any question that is purely local might perhaps be remitted to the original investigation of the States.

The CHAIRMAN. You have come now to a very important matter, which has no doubt been frequently discussed by your association,

and that is the line of demarcation between the jurisdiction of this Department and the jurisdiction of your colleges and experiment stations, and, if you can do so in a few sentences, I would like to have you give the college idea of where that line ought to go.

Mr. POLLARD. May I ask this question before you take that up? You are representing the agricultural schools of the South, and the South is directly interested in two great projects that are being carried on by the Government. Would you be willing for the Government to withdraw, say, in Georgia, and leave your State station to carry on that work?

Mr. WHITE. I might, individually, but I think they would mob me when I got home.

Mr. POLLARD. Here is the point. Are you in a position to do it?

Mr. WHITE. I will be perfectly frank about that. That does bring up, as the Chairman says, a very large question, and a question that is very difficult to answer. This is true, though, and I think that I ought to correct perhaps an impression which seems to be in your minds. I may be wrong about that. I can speak with knowledge concerning the eradication of cattle tick and Texas boll weevil. In the first place, to a certain extent, that is a question of quarantine, and questions of that sort properly belong, perhaps as a matter of police regulation, to the General Government.

Mr. BEALL. Do you remember the effort that was made last year upon the part of the great majority of the Members of Congress to take out of the hands of the States the quarantine proposition in respect to yellow fever?

Mr. WHITE. Yes.

Mr. BEALL. Do you know how any of the gentlemen on this committee voted on that proposition?

Mr. WHITE. No; I do not.

Mr. BEALL. Do you see any more reason for taking out of the hands of the General Government the effort to exterminate the cotton-boll weevil or the tick than there is to take out of the hands of the General Government the proposition to exterminate the yellow-fever mosquito?

Mr. WHITE. Would you mind if I did not answer that question? I am not a politician, and that is a matter of public policy concerning which I am not interested in any way whatever.

Mr. LEVER. Do you not think that the fact that the Government has established a quarantine against Texas fever would make that a national rather than a local matter?

Mr. WHITE. So it would seem.

Mr. BEALL. With reference to the cotton-boll weevil, is that a local proposition?

Mr. WHITE. It is not a local proposition.

Mr. BEALL. Or the cattle-tick proposition?

Mr. WHITE. That is not a local proposition, except in a sense; it is climatic, and so on. Those things, of course, a State might, or a group of States might, undertake. But this is true, to get at it in a general way, sometimes, I say, those problems involve matters of quarantine, and I do not know what the statesmen of the nation might think of that.

Mr. POLLARD. I did not mean to start a question that would embarrass you; that was furthest from my thoughts.

Mr. WHITE. I am not in the slightest degree embarrassed, sir; not at all.

Mr. POLLARD. My question was this: These are problems that we have coming before us all the time. The question does not come only from the South, but it comes from all the sections—I do not mean to make it personal in that sense at all, but the question comes—Where are you going to draw the line? Now, to carry out the spirit of your remarks, if the Government gets the scientific information and the State stations are able to take that information and disseminate it among the people and apply the remedy which this Department has worked out, why should they not do it?

Mr. WHITE. I should think that would be perfectly wise. I may go a little further, speaking of my own personal opinion, and I believe I speak for a good many others who are in my situation when I say I believe in many cases even the investigation, if it was a local proposition, might be undertaken locally. For instance, if there were a local pest in Georgia the investigation of the cause and the methods of eradication might very well be left to local endeavor. In cases that become national and broad, that can not be very well investigated or studied by these separate stations, and where it is difficult to organize a group of State stations, it is an excellent thing to have a great Department at Washington which has practically unlimited resources, from our point of view, to investigate a problem of that sort. I quite agree with you as to the course to be pursued when the material is in hand, and of course they take into their councils and take into cooperation with them the gentlemen who are on the ground. That is so, Doctor Galloway?

Mr. GALLOWAY. Yes.

Mr. WHITE. For instance, the gentlemen in Texas, the entomologists, and so on, are all interested in the extermination of the boll weevil. When it comes to a question of the application of remedies, a question of the method of applying the remedies against the spread of the boll weevil, for instance, it then becomes a question of preserving the property of the State, and I think that is a matter to be taken up at home.

Mr. LEVER. There is necessarily a certain amount of overlap in the work of your experiment stations and the central experiment station here?

Mr. WHITE. Of course.

Mr. LEVER. That is necessary; that can not be avoided?

Mr. WHITE. No, sir.

Mr. LEVER. Let me ask you this other question. Is any proposition with which you have to deal absolutely a local proposition? For the boll weevil there are certain climatic conditions under which it extends. Wherever you find those conditions you find the boll weevil. They exist in half a dozen States. Take the sheep scab; certain conditions bring about that disease. It can not be confined to one State, but it is spread over half a dozen, and it seems to me that the work of the experiment stations should go along hand in hand with the central work here in Washington, and that you can not have purely a local proposition.

Mr. WHITE. That is largely true, of course.

Mr. LEVER. And then it becomes a matter of discretion with the individual in charge of the work?

Mr. WHITE. That is right. It must always go back to that at last.

The CHAIRMAN. As a matter of fact, the relations existing between the various colleges and experiment stations and the Department are entirely cordial?

Mr. WHITE. Absolutely so.

The CHAIRMAN. And you have had no friction?

Mr. WHITE. So far as I know, no, sir. In fact, we do not like to use that word. Neither do you. Of course, sometimes questions arise, and sometimes individuals are at fault on one side or the other. Now, to prevent any possibility so far as we can of that sort we raised that commission of able men which I spoke of, which is going to take up the question of how best to conduct scientific research in the United States.

The CHAIRMAN. I think the formation of that commission is a very wise and timely act.

Mr. POLLARD. Along the line of my previous question I would like to ask you this question. These remedies, of course, aside from that for the cotton boll weevil, are well ascertained. I understand the work of the cotton boll weevil is to a certain extent experimental. They do not know just exactly how to control that entirely, but so far as these other matters are concerned, where the remedy is known, can you tell me to what extent the State stations in the South, especially as regards the cattle tick and the application of what little light has been discovered in relation to the cotton boll weevil, are actually trying to save that branch of their agriculture?

Mr. WHITE. Oh, I think they are; yes, sir. I can speak for that in the case of Georgia, and we are very intensely interested in that matter of the cattle tick.

Mr. POLLARD. I am not speaking of interest, but what are you doing in the way of accomplishing results?

Mr. WHITE. I can state for that particular case, because in my own State we are interested in that. For instance, we have gone so far as to establish a northern line for the limit of the cattle tick, and our department of agriculture and our station men are operating constantly to prevent the passage of cattle across that line.

Mr. POLLARD. And to eradicate the tick?

Mr. WHITE. Oh, yes; local effort is at work.

Mr. POLLARD. I am very glad to know that. Are you prosecuting that work independently of the Federal Government, or in connection with it?

Mr. WHITE. Both.

Mr. POLLARD. I am very glad to know that.

Mr. WHITE. We are operating both independently and in cooperation with the Federal Government.

Mr. WEEKS. How much does Georgia appropriate for its agricultural college and its agricultural department?

Mr. WHITE. It is right difficult to tell for the reason that, as I say, the university is the only institution recognized, and the legislature as a rule makes these lump sum appropriations to the university, and then they are distributed to the various departments by the board of trustees.

Mr. HAWLEY. Is the agricultural college a part of the university?

Mr. WHITE. Yes; a part of the university. Last year they made an appropriation of \$100,000 specifically to the department of agriculture.

Mr. HAWLEY. I would like to comment upon a statement of the doctor in regard to his school. Mr. Pollard asked if the people were profiting by the work of the agricultural stations. In the State I am from they have a number of these schools, and I have attended a number of farmers' institutes, and in every one certain farmers have said that in a certain year something was presented to them, and that acting upon the information they had received, they had produced a crop on a piece of soil that they had never been able to do anything with before, and they gave instances of the crops they had been able to raise on different kinds of soil and different kinds of crops they had never been able to raise before. That is a comment upon your statement.

Mr. WHITE. There is no question in the world but what the work of the agricultural colleges and stations in the States has improved agriculture. I do not think it can be questioned for a moment.

Mr. McLAUGHLIN. In regard to the school you speak of having been established, I would like to know what the course of study is and what the relation of those schools is to the regular local schools.

Mr. WHITE. You mean in Georgia?

Mr. McLAUGHLIN. Yes.

Mr. WHITE. Of course at present it is somewhat tentative. The schools were established as branches of the university in Georgia, where the law prohibits the appropriation of money for any purpose except for the common schools and the State University. We arrange the curriculum of that school. We try to coordinate the work done in those secondary schools with the work done in our common schools. We have a law requiring the teaching of agriculture in our common schools. It is more or less ineffective because we have not the teachers, but we hope to relate the teaching of agriculture in the common schools with that work in these secondary schools, and that with the teaching in the colleges.

Mr. HEFLIN. We have the district schools in Alabama, and the law requires that agriculture shall be taught and it is being taught in the schools, and appropriations are made by the State, too, for the schools. My recollection is the appropriation is \$5,000 to each district, and that is being appropriated in nine districts, I think.

Mr. HAWLEY. I see in this report that the attendance in a year has increased about 300,000 at these farmers' institutes for the year of 1905-6 over that of 1904-5, and that the sum of \$269,672.38 was appropriated by the States for the holding of these institutes in 1905-6 for the dissemination of the knowledge collected by the experiment stations, an increase of over \$42,000 for the preceding year.

Mr. WHITE. May I say that the printed report gives the reports as to the contributions of the States, and I think if fairly interpreted it would bear out my statement that there is no State which in some way does not make some provision for its college and station.

Mr. SNYDER. It is very misleading to speak of the appropriations, because that does not show the amount expended on the buildings, and the heating and the lighting and the care of the buildings.

The CHAIRMAN. We are very much obliged to you, Doctor White, and the other gentlemen of your committee, for your presence here this morning.

Mr. LEVER. This is a very important matter we have under discussion, and it is very interesting to me. Doctor White has concluded,

and we are about, as I understand, to take up Doctor Galloway again, but before we do that, I think it is the desire of some of the members of the committee to hear Doctor Snyder and some of these gentlemen from the other sections of the country. For myself, I would be very glad to hear them.

STATEMENT OF MR. J. S. SNYDER, OF THE MICHIGAN AGRICULTURAL AND MECHANICAL COLLEGE.

Mr. SNYDER. Gentlemen, I certainly feel honored in being called upon, but if anyone would indicate just what line you would like to have my opinion upon, I should be very glad.

The CHAIRMAN. Before anyone acts on that suggestion I would like to ask for some information, growing out of a remark you made a few moments ago, as to the extent to which you are teaching agriculture in the common schools of Michigan, and whether you have supplied those schools from your college with the courses of study which they require.

Mr. SNYDER. I may state that I have followed this matter very closely for a number of years. I have seen a great many statements about agriculture being taught in the district schools and high schools. I have gone to the pains very often to look these matters up, and I am free to say that agriculture is being taught in very few schools of this country. There are a number of States that have such a law on their statute books, but they are inoperative, simply because they do not have the teachers capable of handling those subjects. They do have in their curriculum very often elementary agriculture, or nature study, and in rare instances a teacher is able to do a little in that line, but in no general way is agriculture being taught in the public schools of any State in this country.

The CHAIRMAN. Is it your judgment that in the very nature of things it will ever be possible to teach agriculture in a practical, helpful, economic way in the primary or secondary schools?

Mr. SNYDER. Yes; I think that in a few years it will be, perhaps not in just the way that many of us conceive at this time that it should be taught, but I believe we will have work along that line which will be especially helpful both to country children and to city children. I believe it should be made a department of general education. I am not in sympathy with the idea that we should segregate the farmer and give him a separate school and say to him "This is your school, the school for your boys; they are brought up on the farm and we want to make farmers of them. Therefore we will give them an agricultural education." I believe that agriculture should go into the schools just as manual training has gone into the schools, for its general educational value, and also to open up to the young people the great industry of agriculture and to create and develop their tastes along that line.

In Michigan—and as I am from Michigan I can speak more particularly with reference to that State—we are ready to introduce this study into the high schools, and as the majority of our country teachers are trained in our city high schools the teachers that are trained in the schools having agricultural departments will receive this instruction and will carry it out to the district schools.

The CHAIRMAN. Are you able to supply these high schools with the courses of study that they will follow, or will it be necessary for them to come to the Department at Washington for them?

Mr. SNYDER. We can give them just as much as the Department at Washington can, and perhaps better suited to their needs. Of course I say this with all respect for the Department, since we get a great deal of our information from the Department.

Now, our institution is about to establish a department—in fact, we should have established it before this time had we been able to secure the proper persons to put in charge, but that problem is practically solved—and we will not only be ready to furnish courses of study and suggestions with reference to equipment and teachers, but we expect to send our men out to the high schools to talk to the school boards and to the teachers and lay before them plans and suggestions, and I believe that within five or ten years we will have 100 high schools in Michigan for which we will define courses of instruction in agriculture.

Now, those courses will necessarily differ. We have on one side of the State a fruit belt, and the fruit industry is the great problem with the farmers, and naturally those courses of study will lead along that line. In other parts of the State the dairy interest is the great industry, and the courses of study will lead in that line. But in this way we will touch not only the country children but the city children as well. Now, when I speak of the city, remember I am including the smaller cities; the city of 2,000 that will have a good high school and which will also draw, frequently, as many students as it will have of its own.

The CHAIRMAN. Will you be able to take care of those schools, locally, I mean, as to their expense, or do you look for a Federal appropriation to help you out?

Mr. SNYDER. I do not know that I express the sentiments of my State, and I speak for myself; but I think we shall be able to take care of them locally. Now, we have, as many of the other States have, a great educational system; it is well organized, from the kindergarten up, and I personally would be very sorry to see and would doubt very much the wisdom of the Federal Government coming in to establish a distinct type of schools in the country. Ten or twelve such schools would reach but a very small proportion of the agricultural population, and I believe would do very much more to retard the study of agriculture through the State than it would to assist it.

Mr. LEVER. Your idea would be to establish a course of elementary agriculture in all your elementary schools, as we call them down home?

Mr. SNYDER. Yes; I would begin in the high schools, and as the teachers would go out of the high schools they would have this training. I would not say it is all nonsense, but it is futile to speak of the ordinary teacher giving instructions in agriculture. She can not do it, and no legislation or sympathy will prepare her to do it. We have in Michigan, in connection with 40 of our leading high schools, normal training departments which receive special help from the State, and the function of this normal training department is to take those students from the high schools who expect to teach and give them courses in pedagogy and prepare them for going into the country schools to teach. Agriculture is made one of the subjects in those

schools, and to a certain extent we are trying to prepare those teachers better every year, and we hope in a short time to have well-trained teachers in these 40 high schools. We have agriculture taught in our normal schools, so that the teachers who go out from those schools have considerable training, but the great problem is with the high schools. I have letters every day asking for suggestions as to courses of study and teachers, and we hope within a month or two to have one man or more to send right to those schools to help them to organize these agricultural departments.

Mr. POLLARD. Would you mind stating to the committee just what this course in agriculture comprises that you are speaking of in the high schools? What subjects do they take up?

Doctor SNYDER. As I said before, that would depend somewhat on the section. In the fruit belt they would study physics, for instance, and then the physics of the soils, and then perhaps they would have another course relating to the soils, and that of course would carry with it the conservation of the soil fertility, and how to take care of their soils. That would be one line. They would study zoology and follow that with entomology, economic entomology, such as relates to the destructive insects, and on the practical side, the spraying of plants and how to take care of them, and how to guard against these insects. Then courses on fruits, varieties and selections of fruits, and so forth. There would, perhaps, no doubt, be opportunities within reach of these schools for demonstrations in spraying. The fruits could be collected and used in the laboratory for sorting and grading, and the study of varieties, and so forth. Now, those are just a few lines.

On the other side, suppose it was a dairy section. They would study chemistry and its application to the products of the dairy, perhaps go so far as to analyze the foodstuffs, so that they would know the amount of protein and carbohydrates in the different feeds. They would be taught on the manufacturing side how to manufacture butter, the starters, and the processes of extracting the cream and producing butter and cheese from this product. They would be taught how to test the milk for butter fat, so that they would know whether their cows were productive or nonproductive. They would be taught the care of dairy animals; how to feed for the best profit. They would be taught also the different breeds of dairy animals. They would visit the dairy herds in various sections of the country, and judge those animals and become familiar with the type of a dairy animal, and what to look for; and that, of course, could be carried out in various ways. But, at the same time, and let me impress this, they would be carrying on other lines of work. This could not, naturally, occupy the full day, but they would be carrying on good lines of work in English, good lines of work in science, and, in other words, developing into full men. There is no reason why the farmer should not have a good general education. He is not in this country a serf, and we hope never may be, and I insist that while the country boy receives this country training he should receive also good liberal training. We want him to be the peer of any other man.

Mr. GILHAMS. Do you not believe that our common school education should be more specifically intended to teach the elements of botany, chemistry, and zoology, and all the elements that pertain to agriculture in common, and not to specify in the different parts of the

States as to the different classes of education? Is it not intended that our children should be taught the common elements that the best that is in the child might be found out and developed, and he should then go into the branch of his own choosing?

Mr. SNYDER. Yes; I thoroughly agree with that idea in the schools below, the high school particularly. I think that there we should give them a broad training in all these subjects. In other words, the child should be taught, as I think Doctor Bailey has stated it, in the language of his environments. Nature should be opened up to the child. He should be able to see the beauties about him and receive the inspiration that comes from all these lines of work.

Mr. GILHAMS. Then, it would be well, would it not, in the high schools of our States to teach not specifically the subject of dairying in one part of the State, or fruit culture in another, but to teach the child to apply the elements of chemistry and botany and zoology to the work before him?

Mr. SNYDER. In a broad sense that is true. I am speaking now of the course as it relates to the technical work, and I was anxious to put with that an appeal for the broader culture, and that is one reason that I would include agriculture with our present school organization, because they have the equipment. They have their laboratories for chemistry and physics, they have their departments of English and mathematics and history, so that they would be able to take the pupil right through and give him a general education as well as the technical education.

Mr. GILHAMS. The reason why I was asking these questions was because it seems to me if we should take up specifically and in one part of the State of Michigan a work different from that in any other part of the State it would not be drawing out the elements that were within the school child that we wanted to reach. He might be taught a specific thing, yet not be adapted to the thing at all, but if we teach him the application of the elements, then we arouse in him the spirit for a certain class of work, and if we teach the elements and their general application to agriculture all over the State uniformly, the whole State will be reached in the same way. I was referring to the specific treatment you were speaking of over the State.

Mr. SNYDER. Of course the great pleas for agriculture in the schools is to prepare the children for earning a living. Now, that must necessarily adapt itself somewhat to the local conditions.

Mr. GILHAMS. The child will learn the most readily when he finds the things he likes best.

Mr. SNYDER. That is true, and you might say that of engineering, or anything. Of agriculture, as taught in our agricultural colleges, I think the most important thing is the general principles and not the application in any particular line. I believe that in engineering or anything else we must give technical training in some particular line, and I think that is true of agriculture as well.

The CHAIRMAN. Could you very briefly state to the committee about what you are doing in Michigan to carry to the people the results of your research?

Mr. SNYDER. From the remarks that have been made to-day and some of the questions that have been asked I have been afraid that some of you did not appreciate the work that is being done in the several States. To begin with, each State has an agricultural school,

and the rush of students to these schools within the last two years has been so large that it has necessitated increased appropriations every year to such an extent that they have not felt that they could take care of the students as they should or provide as much money for the experimental work as they would like to in some of these States that seem to have made no appropriation practically for experimental work. I think if you would look into the matter carefully you would find that the number of students had increased so rapidly that it has been a great problem to take care of those boys and girls that have been going to those schools. On the other hand we sometimes do not take into consideration the land and equipment, and the men that must take care of them. I do not know what the record will show for Michigan, but we have eight or ten men who are giving all of their time to experimental work. Last year we brought a trained man from Germany, a bacteriologist, and only a few days ago we elected a specialist in chemistry to do special lines of work, special lines of agricultural chemistry, experimental work entirely. He will have nothing to do with the teaching. We have another man for entomology, to study this one particular line of work.

As to spreading this information, I may say we print from 12 to 15 bulletins a year, and we send them to the farmers of the State without charge. Our bulletin list now numbers 45,000. We take the best information we can get anywhere.

There is one point that has not been emphasized here this morning. It is not the entire function of these agricultural stations to investigate; they must disseminate as well. And a great deal of the best work these stations have done—I should, perhaps, not say the best work, but a great deal of the important work—has been getting together practical knowledge, putting it in bulletin form, and extending it to the people. In addition to the bulletin list we have our farmers' institutes. We spent, I think, this year \$8,500, which does not include the salaries of professors who go out. Some of these people who lecture at these institutes are professors, and those who are not professors are brought to the institution and given a week of training before they go out each fall. The best work that has been done by the Department of Agriculture is laid before them on a specific point, and in that way the best information that can be had from any source, and, of course, along these technical lines of agriculture a great deal of that good information comes from the Department, is put before them in concrete form, and they carry it out. In every county of the State there are a number of institutes; I can not give you the number, but I think 150,000 people in the State listened to those lectures last year. The State is practically covered. There is not a citizen of the State who can not receive those bulletins if he asks for them, and there are very few who are not in reach of these institutes.

THE CHAIRMAN. You are not doing any demonstration work outside of the college farm?

Mr. SNYDER. Yes, we have two stations, and then we are carrying on work in cooperation with certain farmers of the State. We have given spraying demonstrations, and in the farm belt they run a corn train through the sections of the State that were especially interested, and they give demonstrations along other lines, as well.

Mr. WEEKS. Do you give any detailed statement to the Government of the expenditure of the moneys you receive from the Government?

Mr. SNYDER. I understand so; yes, sir. I think they require that, do they not, Doctor Galloway?

Mr. GALLOWAY. Yes, sir; it is published in the annual report.

Mr. SNYDER. In fact, they look after the expenditure of the Government money very closely at times, and cut out items that meet our approval but do not meet theirs.

Mr. POLLARD. I should like to have the Doctor tell the committee his theory as to the proper relation that ought to exist between the experiment stations and the Department here, and as to the correct function, you might say, that should properly be assigned to each.

Mr. SNYDER. That is a great question, and I perhaps stand to one side and can not see that thing as clearly as I would if I were not connected with a State institution. I presume that the function of all these Departments at Washington is largely administrative. At the same time there are great public questions that can be handled here better than anywhere else. For instance, the best methods of handling the semiarid lands of the West, and the problems that have already been referred to, of the tick fever and the cotton boll weevil, are problems that affect a section and can, without doubt, be handled by the Department more economically and more efficiently than by depending on the States. The matter of the introduction of new species, and all those questions, can be handled here, and there are other great problems too that might appeal to certain States as local that can be handled here properly, and I am glad to say are handled very efficiently. I think that there is nothing further that I can add to that.

Mr. LEVER. No one could lay down iron-clad rules as to this function?

Mr. SNYDER. I do not think so at all. And I beg you to remember this, that it is a question of men more than a question of money or locality, and the great problem that hampers all of us in this scientific work is not so much a problem of money as a problem of men. If you were to give our station \$100,000 to expend next year, we simply could not find the men unless we should make the salaries so large as to simply rob other institutions of their help. And in all these problems it seems to me that the question of efficient workers is the important problem. It does not make very much difference whether a man is working on some of these general problems in New York or Colorado or Alabama, the results of his work are open to all.

Mr. LEVER. In that connection, I understood you a moment ago to suggest that you were not very favorably disposed to this idea of district agricultural schools. I would be glad if you would discuss that for a few moments.

Mr. SNYDER. I do not know that I have anything to add on that problem, but I have felt that for Michigan it would be better to work through the great organization that we have at present, rather than to introduce separate schools. I believe the work could be made more efficient and reach a much larger number. And there is this point that I want to emphasize in this connection. If we establish these schools of agriculture for the farmers' boys and the farmers' girls, we deprive the city child of these opportunities, and in Michigan

there are more young people to-day in our cities and villages desiring agricultural training than in the country. Sixty per cent of the young men in our agricultural courses come from the cities and villages, and if agriculture is taught in connection with our public school system it will reach all, and I believe that it should be the policy not to segregate the farmer and say, "Here is your school; you take this training and be a farmer all your life." Give him the best possible training and let him go to the city if he wants to and if the city boy wants to get back to the country, give him an opportunity to get back. Agriculture can stand on its own feet. It does not need any particular prop or any special help. Give it a fair chance, but nothing more, and it will be all right. And in giving it an equal chance it should be taught universally, as far as possible, and if that is done I have no fear for agriculture.

Mr. LEVER. It is true that it would be impossible to supply these district schools with experts at the present time?

Mr. SNYDER. Right at present, but in Michigan we are training quite a large number of teachers who will be able to do some intelligent work in the district schools, and if we had it introduced into the high schools I think it would very readily percolate into the schools below, and that we should have agriculture taught in an intelligent manner in the district schools.

Mr. HEFLIN. Will not having the district schools in the State, instead of only one agricultural college, hasten teaching of agriculture in the other schools, putting it closer to the people and letting them see what it is?

Mr. SNYDER. I am afraid it would retard it. I am afraid the people would say, "Here is your agricultural school. Go there if you want to study agriculture." I believe in divorcing it from the public school we would retard it. That is my theory and my fear as well.

I am very much obliged to you, gentlemen.

The CHAIRMAN. We are very much obliged to you.

Mr. GILHAMS. Doctor Stone of Indiana is here, and if it is the sense of the committee we would like to hear from him.

STATEMENT OF MR. W. E. STONE, OF THE INDIANA AGRICULTURAL AND MECHANICAL COLLEGE.

Mr. STONE. I should like to say just a word. It seems to have been the impression of the committee that possibly some of these institutions were not bringing the results of their discoveries and their teachings close enough home to the farmer. I think in all of the States they are doing all they can according to their lights and their resources. I want to tell you what we are doing in Indiana; not that we are doing the best, for I do not think we are. In Indiana we have the agricultural college and the experiment station. The college devotes its time to teaching. It teaches a great variety of classes in agriculture. We invite some students to come and spend four years in a thorough, scientific course of agriculture. We offer another course to students of two years, which embraces largely, and only, the technical subjects. We offer another course to students which is only ten weeks in length, just beginning at this season, to accommodate the boys who can not leave the farm at the active season. We have just completed the annual farmers' week at the

university, which brought a thousand and more farmers and their wives who came there to spend a week to follow an accurate schedule of work, going to school all day with their notebooks and hearing lectures and participating in demonstrations upon practical matters. So that this range of teaching at the university goes all the way from the farmer—middle-aged or old man, or boy, as the case may be—who comes to spend a few days, to the other one who can spend a few weeks, to the man who can spend four years. In that way we try to reach the people who can leave their homes and come to the school.

These are not all of the departments we have for teaching. The farmers' institute organization, which is a part of the university, goes out into every county in the State and carries the gospel to those who perhaps can not come to the university. We hold every year, by law, an institute in every county in the State, and in many counties two or three such institutes. The purpose of these institutes is strictly educational. That is the policy. No entertainments, but work, in those institutes, which are two or three days in length. In that way, last year by actual count we reached 50,000 people who came in to be taught in their own counties.

That is not all. We have been running for the last year or two these so-called corn and fruit trains, and we have covered all of the railway mileage in the State in cooperation with the railroads. Last year we carried out oral teaching to 50,000 people who came to the stations and listened to a brief lecture or a demonstration, or to look upon the charts or the pictures we had prepared to prove some important points, mostly in connection with corn growing or the selection of seeds, or fruit growing, or something of that sort. So that our institution last year gave oral teaching, directly from the mouths of our teachers to the listeners, to 100,000 people in our State.

That is not all. We have the station; and let me say that the income of our experiment station is at the present time upward of \$80,000, and the State has appropriated \$100,000 for a building for that station; and the State appropriations carry with them the injunction that this money must be used to some extent to disseminate information, so that we publish bulletins, newspaper bulletins, and press circulars, which go broadcast everywhere. Then we send the station workers out. Last year we had 300 demonstration experiments or cooperation experiments scattered over the State where, in cooperation with a farmer who was willing to give time and help, we were making tests of varieties, and tests of soils, and doing that sort of work. We keep constantly in the field a dairy expert who goes and tests herds and gives lectures and tries to encourage a more rational system of dairying all over the State. That reaches an immense number of people, you see. We are not reaching every person in the State; there are always some who do not care, who are indifferent, who will not listen, but every person who has any remote interest in improving his practice in agriculture is reached by or is within reach of some form of teaching from our institutions. That is enough upon that point perhaps.

I want to say a word or two, now, about this matter of teaching agriculture in the public schools. We have a very efficient system of educational organization in our State which recognizes the high

school as a part of the public schools of the State. That is rather a unique thing, I think. There is a great deal being said and written in our State about this matter of agriculture. There is a great interest in it. In one county last year the county superintendent of schools took up the matter of corn cultivation—this is a great interest in our State, corn culture—and he enlisted 140 boys in his county to raise an acre of corn each, under conditions of instruction which were given to them. Our men from the college went out and administered that instruction. Not all of those 140 boys finished their work, but over 70 completed their summer's work, raised their 1 acre of corn, harvested and weighed it, and all that, and brought their corn in to the county seat to be judged and to judge it themselves in competition. Now, the average product of corn in that county by the expert corn raisers, the fathers of these boys, is between 35 and 40 bushels an acre, and these 70 boys who harvested their product and brought it in to the county seat for exhibition—not the whole crop, but samples—averaged more than 70 bushels per acre.

Mr. POLLARD. Do you remember what county that was?

Mr. SNYDER. Laporte County. That is a small demonstration of what a little teaching and training can do for the farmers in so small a thing as raising corn, which they all think they know all about.

Mr. HEFLIN. Do you suppose 250 bushels of corn could be grown on 1 acre?

Mr. SNYDER. I could not say. But I know that these boys beat their own daddies at their own business in one summer's training.

Mr. HEFLIN. They claim that in South Carolina.

Mr. LEVER. That is a matter of record in South Carolina.

Mr. STONE. I know that we all fall very far short of what could be done in all our agricultural operations. Our people had before them last winter in the general assembly a bill for the purpose of permitting any county that saw fit to establish a high school to do so, and the legislature would not have anything to do with that; they turned it down. They did not think that was in accordance with the policy of education in our State. But in more than half the counties of the State the county authorities are encouraging and actually doing some form of agricultural teaching in the public schools. They are not doing that with the idea of specializing the work of the pupils in agriculture. The purpose, broadly, is to regard agriculture as of large human interest, the same as commerce or business, and to recognize it as a part of a thorough education in the public schools, to give the pupil some knowledge of this great human interest, leaving it to the teacher, as he teaches in one or another locality, to apply the teaching of the natural sciences to the prevailing agricultural interest in that locality, as this man did who got the boys to raising corn. In other localities it is fruit growing or dairying or something of that sort, and we feel there—I think I understand the situation in our State—that we are very far from being ready at this time to establish schools of agriculture in the primary or secondary grade. We have not the teachers, and the public is not ready for it, and it would be a very radical experiment indeed, and I fear would fall very far short of success if established at this time.

I think that is all I have to say.

STATEMENT OF MR. C. G. CURTIS, OF THE IOWA AGRICULTURAL AND MECHANICAL COLLEGE.

Mr. CURTIS. I do not know that I have sufficient to say to make it worth while to occupy any of your time. There have been several thoughts presented here and it seems to me you have covered the ground quite fully, but in regard to this matter of carrying agricultural information to the people of the various States and communities, I wish to say that that has taken form in our State to such an extent that we have been almost overwhelmed with the demands for technical information pertaining to agricultural instruction and investigation coming from that institution. And what is true of our State I know is true of a great many States, particularly of the Middle West, and it is one of the most gratifying phases of this work of agricultural instruction and investigation of the present time. Some eight years ago we conceived the idea in Iowa that the information and instruction given at that institution should not be confined to the students that come to the institution, and we organized at that time what was the first farmers' short course, offering instruction at first only in stock judging. Later we took on corn judging, and later added other lines, until now each year we have from seven or eight hundred to nine hundred or a thousand farmers coming there for two weeks of solid instructional work; and some of those farmers come back year after year, feeling that they can not afford to miss the instruction offered in that short course. That is one phase of the work that has been taken on in our State.

Then the demand for this work has been growing to such an extent that we have organized an extension department, in which we have ten or a dozen instructors giving all of their time to various forms of instruction carried to the people in the various communities of the State. They are holding similar short courses of instruction in ten counties of the State this winter. This is in addition to the farmers' institutes that are held in every county. Then during the summer season a part of that corps gives its time to the teachers' institutes, and to conferring with school superintendents and boards of instruction about methods and means of introducing agriculture into the high schools and into the secondary schools of the State. Then another form of work we have taken up is demonstration work on the county farms of the State. We have what is known as a county farm in each county of the State, and we have organized and are giving each year demonstration work in the growing of crops, and cultivation, and soil fertility tests on ten or a dozen of the county farms of the State.

The CHAIRMAN. These are what are ordinarily known as the poor farms?

Mr. CURTIS. Yes; the poor farms. And one of the lines of work we took up there that proved of exceeding interest was this: In the spring of the year we send a man to the farms and the communities surrounding them and get from the farmers, from the box as the corn is being planted in the fields, a quart of seed, and bring it to the county farm and plant it side by side in a plat with forty or fifty other samples obtained in the same way from adjoining farms; and at the close of the season, at the time this corn is harvested, a county farmers' picnic is held and the people come in from the farms

to the extent of two or three thousand, bringing their lunches with them, and spend the day examining and studying the results of the experiments, and the differences are, of course, very striking, and the lessons are of exceedingly great value. The improvement of good seed corn and the improvement of varieties of seed corn and other crops are brought before the farmers of the county who come in each year to attend this work and to look over the results in that way.

All this, as I say, made a very great demand upon our instruction force, and we organized this extension department to devote its time exclusively to that kind of work. In addition to that, of course our heads of departments, instructors and investigators who are connected with the institution in its regular work, go out to do such work as they can find time to do without neglecting their other duties. But this demand that is being made upon the educational institutions for work along agricultural lines is the most gratifying feature of this entire movement, and in addition to this demand there is another demand coming, and the next great movement is going to be the introduction of agriculture into the secondary schools, in some form. It probably will not take just the same form in each State. The Georgia plan, which has been described to you, may be satisfactory in that State, and has been adopted in that State, and will be adopted in other States. In other States it will take a different form. But I trust that it may have your sympathetic consideration and the cooperation of you gentlemen in whatever way you may think best. I am sure, however, that it is coming.

We have held to the view in our State that we ought not to have general legislation requiring the introduction of agriculture into the public schools of the State until we are prepared to present it in the best form. One of the members of our extension staff is devoting his time exclusively to the schools and the matter of our relations to the common schools in this matter of introducing agriculture into the schools. Agriculture in some form, agricultural instruction in some secondary form, is coming into the high schools, either as we have them organized at the present time or in high schools established for that purpose. There is a very great interest in it. These schools where we have held short courses are interested and want to extend the work again, and instead of limiting it to one or two weeks, as in the past, they want regular instruction in agriculture in their schools. They want a school of agriculture. I think it will take the form of an agricultural high school, either in connection with the present high school system or as a separate system of agricultural high schools.

The CHAIRMAN. Doctor White, the expectation was that this hearing would be concluded in about an hour, but I am sure that no member of the committee regrets that it has taken two hours. If every member of this committee could visit every agricultural college in the United States the work on the committee would be much more valuable. Of course, that is impossible; but next to that in value to this committee will be the information which you gentlemen can bring, and I repeat the expression of my hope that when your committee is here again you will call upon us.

Doctor WHITE. We thank you, Mr. Chairman, very cordially, for the hearing you have given us.

(At 12 o'clock m. the committee took a recess until 2 o'clock p. m.)

APPALACHIAN AND WHITE MOUNTAIN FOREST RESERVES.

COMMITTEE ON AGRICULTURE,
HOUSE OF REPRESENTATIVES,
Thursday, January 30, 1908.

The committee met at 10 o'clock a. m., Hon. Charles F. Scott (chairman) in the chair.

The CHAIRMAN. For the information of the gentlemen who honor us with their presence here this morning, I will state that the Committee on Agriculture has been engaged in the past three weeks on hearings looking toward the completion of our appropriation bill, to provide for the expenses of the Department during the coming year. Upon the request, however, of numerous organizations interested in the bills that are pending before the committee, looking to the purchase of timber tracts for the establishment of what are known as the White Mountain and Appalachian forests, the regular hearings have been interrupted, and we have set apart this day for such presentation as those interested in these forest bills desire to make. I mention this fact not to suggest that we have interrupted our regular work with any reluctance, but merely to advise you that we are not now in regular consideration of the forest bills, which you are here to advocate. Your observations here this morning, however, will be stenographically reported and printed, and will be given just as careful consideration, I may assure you, when we do come to consider the forest bills, as if they were made in immediate connection with those bills. I have been advised that Governor Hoke Smith, of Georgia, will conduct the hearings on the part of the various organizations that are represented here, and I will therefore present Governor Smith, who needs no introduction, I am sure, to those here this morning, and will ask him to take charge of the hearings.

Governor SMITH. I understand that Mr. Lever wishes to present a resolution from South Carolina before we proceed.

Mr. LEVER. Mr. Chairman and gentlemen of the committee, in order to make it a part of the record, I desire to read a few letters here and present certain resolutions. I desire to read a letter from Hon. Joseph E. Ransdell, chairman of the rivers and harbors congress, with respect to this bill. It is as follows:

COMMITTEE ON RIVERS AND HARBORS,
HOUSE OF REPRESENTATIVES, UNITED STATES,
Washington, D. C., January 18, 1908.

HON. ASBURY LEVER,
House of Representatives.

DEAR MR. LEVER: Responding to your inquiries in regard to the proposed Appalachian-White Mountain Forest Reserve, I desire to say that while I am not entirely familiar with the terms of the bill, I am heartily in favor of the general idea, and sincerely hope that favorable action, looking to the establishment of these great forest reserves, will be taken at this session of Congress.

My study of the navigable waters of the United States has convinced me that there is a very close and intimate connection between forestry and navigation. Indeed, I am very much inclined to agree with the French ambassador, M.

Jusserand, who so eloquently said to us at the recent waterway convention in this city, "No forests, no rivers."

Incidentally, I consider the preservation of the forests as of great importance in preventing disastrous floods. I have been such a heavy personal sufferer from floods that I have had occasion to study this question rather closely.

With high esteem, I am, sincerely yours.

JOS. E. RANSELL.

I read now a letter from the governor of South Carolina dated January 13, 1908:

STATE OF SOUTH CAROLINA,
EXECUTIVE CHAMBER,
Columbia, January 13, 1908.

HON. A. F. LEVER,
Washington, D. C.

DEAR MR. LEVER: Your kind favor of the 10th instant, notifying me that on the 30th of January the bill which you introduced establishing national forests in the Southern Appalachian and White Mountain ranges is to be heard before the Committee on Agriculture, in Washington, D. C., is to hand, and I thank you for it. I feel great interest in this matter and only wish that it were so I could be up there to help you in the matter. Our legislature, however, meets to-morrow and will be in session at that time, and, as you know, it will be impossible for me to leave at the time indicated. I would like to give my moral support in person to the measure and also to speak some words in behalf of your bill if I could get off, but, as this will be impossible, you can, if you desire, read this letter to the committee and express to them for me the great interest I feel in the measure. If I can give any further service in the matter, I shall be pleased to do so.

Regretting my inability to be present in person and with assurances of high regard, I am,

Yours, very truly,

M. F. ANSEL, Governor.

Mr. Chairman, I desire to present to the committee also a copy of a concurrent resolution passed by the general assembly of South Carolina on January 27 in reference to this bill.

The resolution reads as follows:

- Whereas the preservation of the forests of our country is a matter of supreme moment to the people of this State and section; and
 - Whereas the Hon. A. F. Lever, Congressman from South Carolina, has introduced in the National House of Representatives a bill that seeks to preserve in part the forests of the Southern States.
- Therefore be it resolved by the house of representatives (the senate concurring) That the Senators and Congressmen from this State be urged to exert their whole influence for the passage of this most important measure at this session of Congress.*

Mr. WEEKS. Mr. Chairman, a large number of associations in New England have passed resolutions in favor of this enterprise, and among them I have a telegram received this morning from a representative of the Merchants' Association of Boston, which represents the larger part of the merchants of Boston, and very considerable interests. It is as follows:

BOSTON, MASS., January 29, 1908.

HON. JOHN W. WEEKS,
House of Representatives, Washington, D. C.:

Directors of the Boston Merchants' Association favor protection of the White Mountains Forest Reservation, and instruct me to request you to present their action at hearing before Committee on Agriculture, January 30.

JOHN C. COBB,
Chairman Legislative Committee.

I should like to have not only this made a part of the record, but any other resolutions that have been passed by organizations of New England, which I will present later.

The CHAIRMAN. Without objection, it will be so ordered.

Mr. HASKINS. Mr. Chairman, I have several letters and memorials bearing upon this same question that I have received from people interested in the matter in the State of Vermont, but I have not them here, and I supposed I could present them at any time to the committee, not desiring to take up the time of the committee at this hearing. I will present them and make them a part of the record hereafter.

The CHAIRMAN. Very well. Senator Lodge, of Massachusetts, is in the room and desires to be heard at this time for the reason that he has a committee appointment later.

STATEMENT OF SENATOR HENRY CABOT LODGE.

Senator LODGE. Mr. Chairman, I am very much obliged to you. It is absolutely necessary for me to be at a meeting of the Committee on Military Affairs of the Senate at 10.30, and therefore I ask your indulgence merely to take this opportunity of expressing the very deep interest that all my section of the country takes in this question. The Senate last year passed the Appalachian forest bill, and it is considered by the people of my State—although no part of the reservation lies in Massachusetts—of the most vital importance to our industries, owing to the rivers and the water supply. There are a number of people here from Massachusetts who can explain this matter and the needs of New England much better than I can, and I merely wished to explain to you, Mr. Chairman and to the committee, why I was obliged to leave, for I should very gladly otherwise have stayed and listened to all the proceedings.

STATEMENT OF HON. ANDREW J. PETERS.

Mr. PETERS, of Massachusetts. Mr. Chairman and gentlemen, I will not take the time of the committee to go into this matter, but I wish to present to the committee a resolution which was sent to me by the Massachusetts State Board of Trade. That organization, sir, is composed of 40 representative bodies from the principal cities in Massachusetts. It reads as follows:

JANUARY 28, 1908.

Resolved, That the Massachusetts State Board of Trade gives its unqualified indorsement of bills now before Congress for the purpose of acquiring forest reserves in the Appalachian Mountains and White Mountains, to be known as the "Appalachian Reserve" and "White Mountain Forest Reserve," to the end that these areas may be properly controlled and protected, not only for their scenic value, but for the preservation of the sources of water supply of rivers which furnish the power for vast manufacturing interests.

Yours, very truly,

RICHARD L. GAY, *Secretary*.

I wish to say, Mr. Chairman, that this association is a representative business association of our State.

Governor SMITH. There are several gentlemen who have resolutions from various bodies which they wish to file in the same way, and if it meets with your approval I will ask that that be done.

The CHAIRMAN. Without objection, that will be done.

Mr. C. J. H. WOODBURY. I am secretary of the National Association of Cotton Manufacturers, whose members represent about \$750,000,000 in the cotton manufacturing business, with about 20,000,000 spindles, and I wish to present their resolution, which I will file, and also a set of resolutions from the Massachusetts Institute of Technology. Without taking the time of the committee, I would say that we have four of our members here who are very large manufacturers, and if it is the pleasure of the committee, I know they will add information of great value.

The resolutions referred to are as follows:

[The National Association of Cotton Manufacturers, successor to New England Cotton Manufacturers' Association, Boston, Mass.]

At the eightieth annual meeting of this association held at Boston, Mass., April 25-26, 1906, the following preamble and resolutions were adopted:

Whereas the preservation of the forests at the headwaters of streams rising from the Appalachian and White Mountains is an important element in the development of commercial enterprises, and would be of great benefit to the water powers on the rivers flowing from these mountains, and, therefore, to all the cities, towns, and mills on these rivers: Now, therefore,

Resolved, That the New England Cotton Manufacturers' Association, in annual meeting assembled, thoroughly approves and indorses Senate bill No. 4953, for the purpose of acquiring national forest reserves in the Appalachian and White Mountains, to be known as the "Appalachian Forest Reserve" and the "White Mountain Reserve;" and, further,

Resolved, That this association earnestly urges the New England Senators and Representatives in Congress to give Senate bill No. 4953 their constant and vigorous support.

A true copy.

Attest:

C. J. H. WOODBURY, *Secretary*.

RESOLUTIONS ON FORESTRY RESERVES.

[Massachusetts Institute of Technology. The Society of Arts.]

BOSTON, MASS., *January 24, 1907.*

Whereas (1) The preservation of the forests among the Appalachian and White Mountains, which contain the headwaters of many streams, is an important element in the development of commercial enterprise and is essential for the maintenance of the water powers of the rivers having their sources in these mountains, and therefore a benefit to the people deriving a livelihood from the industries dependent upon these water powers;

(2) The maintenance of these forest tracts tends to conserve the regulation of rainfall, and therefore to the raising of agricultural products and to the health of the people;

(3) The forests are a great advantage to the States in which they are situated from their contribution to the scenic beauties of nature, and furnish conditions of salubrity and comfort during the summer, which form a means of attracting great numbers of summer tourists;

(4) The educational effect of life in the open has been abundantly recognized by the establishment of summer camps for the training of boys in athletics and woodcraft, and permanent places for the encouragement of this important movement would be provided by such reserves as are contemplated;

(5) A forest reserve would furnish opportunity for practical experiments in forestry and for demonstrating the value of the cultivation of trees, and would also serve as a place for the protection of the wild creatures of the woods, many of which are threatened with extinction;

(6) The conservation of the forests would tend to husband a portion of the national wealth, which has been grossly wasted by careless methods of cutting, and we believe that under the skilled supervision which such reservations would

be expected to receive that the supply from the natural forest growth would be made a source of material income toward the expenses involved in the maintenance of the whole tract: Now therefore be it

Resolved, That the Society of Arts at this meeting held at Boston, Mass., January 24, 1907, thoroughly approves and indorses the legislation proposed in House bill No. 19573 entitled, "A bill for the purpose of acquiring national forest reserves in the Appalachian Mountains and White Mountains, to be known as the "Appalachian Forest Reserve" and the "White Mountain Forest Reserve," respectively, and that the society urges the honorables the Senators and Representatives from Massachusetts to give this bill their constant and vigorous support; and, further, be it

Resolved, That the secretary be requested to transmit a copy of these resolutions to each of the Senators and Representatives from Massachusetts in the present Congress.

STATEMENT OF HON. HOKE SMITH, GOVERNOR OF THE STATE OF GEORGIA.

Governor SMITH. Mr. Chairman and gentlemen of the committee, I recognize the responsibility of undertaking to lead in the presentation to you of some of the reasons for the passage of this bill. I believe no question of greater national importance will come before Congress at its present session. For that reason I recognize the responsibility. I appreciate the compliment for that reason, and for another which I may be pardoned for mentioning to these gentlemen. Born in the mountains of North Carolina, although now a citizen of Georgia, I look back to New Hampshire where my father was born, and where, upon one of its hillsides, three generations of his ancestors lie buried. We believe, gentlemen, that the preservation of these forests is absolutely essential for the future prosperity of States reaching from Maine to Alabama. We believe that the great body of the citizens of these States who study the problem will reach the same conclusion. We recognize it as one that can not be handled by States; it can not be handled by individuals. The forest that supplies the natural reservoir for navigation at the mouth of the Savannah River is located in the mountains of North Carolina. North Carolina can not provide by her appropriations to take care of the waters of the Savannah River. The forests that supply the power to run the mills of South Carolina, that furnish the natural reservoir for the water that flows down into that State to operate the mills of South Carolina, lie in other States.

We desire to present the subject to you to-day along three lines of thought: First, the importance to the timbering interest of the preservation of these forests for the future timber supply for the States east of the Mississippi. Second, we desire to present it to you from the standpoint of power used to operate machinery. We believe the preservation of these forests absolutely essential to the preservation of the water power which to-day operates so many mills, so many manufacturing enterprises adjacent to the White Mountains and the Appalachian Range, both on the eastern and the western side of the range, so necessary for the additional enterprises that are contemplated, absolutely essential to the power now in use. We expect to present it to you from a third standpoint. We expect to show from experts who have made a study of the subject that the navigable streams on the west, from the Ohio south, and all along the line on the east, are dependent in large measure upon the preservation of these forests and upon nature's reservoir for water, which the

forests supply, and upon the protection of the streams from the wearing of the hills, which will carry the sediment into the streams and gradually lessen their value for navigation purposes. I just received this morning from the governor of North Carolina certain resolutions passed by the legislature of North Carolina indorsing the project. I will not read them, but with your approval will file them with the committee.

There are here before you representatives of the States upon the Atlantic Coast, from Maine to Florida. There are also representatives here, I think, of every State on the western side of the White Mountains and the Appalachian Range. For the convenience of the committee, those interested have placed together a large number of the resolutions showing the action of various bodies indorsing these resolutions. There are more than 66 bodies, from New Hampshire to Georgia, and as far west as Wisconsin and Michigan, which have handled the question and expressed their interest in and approval of this measure. I will only call your attention to a few of these bodies without reading the resolutions: The American Civic Association; the American Cotton Manufacturers' Association; the American Forestry Association; the American Institute of Electrical Engineers; the American Mutual Newspaper Association; the Carriage Builders' National Association; the Chamber of Commerce of Pittsburg; the Federation of Women's Clubs of Grand Rapids, Wis.; the Merchants' Association of New York; the Merchants and Manufacturers' Association of Milwaukee; the National Association of Cotton Manufacturers; the National Association of Box Manufacturers; the National Association of State University Presidents, and so on and so on. With your permission, Mr. Chairman, I will file with your committee these 66 sets of resolutions by various bodies of a similar character indorsing this bill.

We desire next to call your attention to the report of the meeting of this committee two years ago and to the statements then made and the information presented in behalf of these reserves. The gentlemen who will appear before you to-day will, as a rule, be in addition to those who appeared before, for, as you have a record of their expressions of opinion in your stenographic report of the meeting held two years ago, we deemed it advisable to a certain extent to supplement what was then said, by the statements of others who did not then appear, and we ask to be considered as specially a part of the record which we present this morning the stenographic report of this committee hearing held two years ago.

Mr. HASKINS. You would make that a part of the record of this meeting?

Governor SMITH. Yes, sir; that is what I meant to ask, that that report be made a part of the record of this meeting.

The CHAIRMAN. Without objection it will be so ordered.

(The resolutions presented by Governor Smith will be found in the Appendix.)

Mr. SCHOEN. As resolutions are now being offered, I will ask to present certain resolutions.

(The resolutions referred to will be found in the Appendix.)

Mr. G. F. SWAINE. Mr. Chairman, representing the State of Massachusetts, I would say that I have some resolutions to present from the American Society of Civil Engineers, and I wish to state here

that to the best of my knowledge, and to the best of the knowledge of the secretary of that society, that society has never before memorialized Congress for the passage of any bill, but it considers this of such importance that the board of directors has passed these resolutions.

(The resolutions referred to will be found in the Appendix.) •

The CHAIRMAN. Let me ask again if there are any other resolutions that it is desired to present at this time. If so, we would be glad to have them now.

Mr. HARVEY N. SHEPARD. I have a resolution here from the State Board of Trade of Massachusetts. I represent the governor of Massachusetts, the Massachusetts State Board of Trade, and the Appalachian Mountain Club.

(The resolution referred to will be found in the Appendix.)

Governor SMITH. I think there are several sets of resolutions which had not come in to the committee last night, and the gentlemen who have them will be glad to present them.

Mr. LIGON JOHNSON. I should like to present resolutions passed by series of boards of trade throughout the South.

(The resolutions referred to will be found in the Appendix.)

Mr. PHILIP W. AYRES. Mr. Chairman, I beg to present a letter from the governor of the State of Vermont, regretting that he is not able to be present at this time at this meeting.

(The letter referred to will be found in the Appendix.)

Mr. GEORGE F. MEAD. The Boston Fruit and Produce Exchange, whose president asked me to represent that body here, is in favor of the proposed legislation, and I also represent the Boston Associated Board of Trade. That is a representative body embracing all the trade bodies of the city of Boston, as the State board represents the State of Massachusetts.

Mr. SAMUEL B. SMITH. Mr. Chairman, I wish to announce that I represent the Manufacturers' Association of Chattanooga, Tenn., which has authorized me to indorse the proposed legislation in every possible way.

Mr. WILLIAM S. HARVEY. As chairman of the committee on forestry and irrigation of the National Board of Trade, I have a series of resolutions which were passed last week at the annual meeting of the National Board of Trade, representing 72 commercial bodies and boards of trade, representing almost the entire United States, and I will present these resolutions to the committee.

(The resolutions referred to will be found in the Appendix.)

Mr. JOHN E. WALLACE, Jr. Mr. Chairman, as secretary of the Alabama forestry commission, and representing the State of Alabama and the governor of Alabama, I wish to indorse this legislation.

Governor SMITH. These gentlemen are in addition to those we had last night. We have not asked those who appeared with us last night and furnished the 66 sets of resolutions to take your time to present them individually. It was agreed that they should be consolidated and put in convenient form. These are simply in addition to those. If there are no further resolutions to be offered, I will be glad to ask Mr. Pinchot to come forward now and present his views upon this subject. I would suggest, Mr. Pinchot, that you make a statement with reference to what has been your business, and then proceed to discuss the subject.

STATEMENT OF MR. GIFFORD PINCHOT, CHIEF OF FOREST SERVICE OF THE UNITED STATES DEPARTMENT OF AGRICULTURE.

Mr. PINCHOT. With the permission of the chairman I will say that I am Chief of the Forest Service of the Department of Agriculture, and that I have been personally familiar with the Appalachian region for some seventeen years, having studied much of it on foot and on horseback, and carried a pack over a great deal of it, and during the whole of that period I have been considering the Appalachian Mountains from the point of view now in question. I am also familiar to a less degree with the White Mountain region, and have been, from the start, in touch with this movement and have been endeavoring to satisfy myself of the actual facts in the case and of their relative importance. In a statement which I had the honor of making before the Committee on Agriculture last week I said that the United States was in a dangerous condition in regard to the timber supply. We are on the verge of a timber famine, indicated by the high prices to which timber has risen in the last few years, and by the fact that the best estimates now available indicate a total supply in the country, neglecting growth, for only about twenty years, and that the most liberal allowances which could be made for that growth would not extend the supply more than an additional ten years. Of the total consumption of timber, about one-fourth is hard wood, or perhaps 25,000,000,000 out of a total of 100,000,000,000 feet. While in the last seven years the production of soft woods has increased 16 per cent, the production of hard woods has decreased 15 per cent. In other words, we are very much nearer the exhaustion of our hard-wood supply than of our soft-wood supply.

Now, there are two great regions from which the bulk of our hardwoods have been coming—the Ohio, Indiana, and Illinois field, and the field lower down on the Mississippi—and these have decreased rapidly. About 48 per cent of the cut now comes from the Appalachian region, and this is about to become the only supply of hardwood timber on any large scale for the whole United States, because the land that has been covered with hardwood timber in the other sections is largely passing into agriculture. Accordingly, the timber supply of this region is of crucial importance so far as hardwoods are concerned, and we use in our industries a larger percentage of hardwoods than any other nation of which I am aware. I understand that this statement of mine is to be restricted to the forestry side of the question.

Governor SMITH. If other matters come up incidentally, do not restrict yourself to that.

Mr. PINCHOT. Very well, I will not restrict myself to that.

The character of the forests in the Appalachian regions furnishes an argument for this reservation, entirely apart from the purely timber supply phase of the question of which I have spoken. In the Southern Atlantic States the southern and northern floras meet, and there is the richest body of hardwoods, both in quantity and in variety of species, in the United States, and therefore the possibility of usefulness and of the production of timber in the Southern Appalachians is far greater than that in any other region, because of the extremely varied character of the timber. The black walnut, cherry, various

oaks, and chestnut, and especially the yellow poplar, are there found in their best development, and the character of the forest is such that, with the exception of small areas in the bottom lands of the Mississippi Valley, the stand of hardwood in the Southern Appalachians is heavier than that of any other part of the United States.

The forest is comparatively free from danger by fire when uncut. Fires run through it, but they do not destroy the old timber to the extent that they do in the West or in the White Mountains, for example, because the covering of leaves on the ground is comparatively light. But when logging of certain kinds comes into the hardwood forests of the Appalachians, then destruction follows in a very remarkable degree, and the danger of forest destruction in that region is not surpassed by that in any other part of the United States, except some of the higher mountains in the West.

Taking advantage of Governor Smith's permission, I want to indicate one fact which I myself observed, as bearing upon the immensely exaggerated importance, so to speak, which forest preservation has on these steep slopes. I have stood with one foot on each side of a little brook and washed my hands and face in it in the summer when the water was low, and this same brook, which had its head in the steep slopes on which the forest had been destroyed, during floods had carried and piled up hemlock logs 3 feet through and as long as across this room, in windrows, and had moved boulders of very many tons in weight, simply because of the deforestation of this steep watershed with a uniform grading. To take up another subject: The examination upon which I base my opinion of the necessity for preserving the White Mountain and Appalachian forests has been a very thorough one. In addition to what personal experience I have had in both these ranges, a very careful examination was made of the whole subject by the Forest Service and the geological survey of North Carolina some six or seven years ago, from which resulted careful maps of the regions, thorough descriptions of the timber, and a general plan for the management of the forests in case the purchase was made.

In addition to that, a very careful study was made during the past summer, so that we have now before us all the facts which could be reasonably desired in order to reach a judgment. We know the character of the forests, the stand of timber, the approximate value of the uncut and the cut-over lands, and the approximate cost of buying the area recommended by the Secretary of Agriculture. We are then ready, so far as I understand the case, to present a definite scheme to the committee without the necessity of further examination. The area which it is proposed to buy lies in the higher portions of the mountains. The agricultural lands are lower down on the slopes and in the valleys. The richer part of the forest lies naturally on the best agricultural lands, and this it is not proposed to take at any time. All that is needed is the higher mountain forests, important for the protection of the headwaters of the streams, and these will ultimately pay for themselves in the production of timber. As I had the pleasure of telling the Committee on Agriculture, last week, the national forests in the last two and a half years have been made to pay for themselves and a little more, so that this year we have a net surplus of receipts over expenses in the national forests of over \$100,000. The same thing will come to pass in the Southern Appalachians. With

the rapid rise in the price of timber there is no question whatever but that we would find in the United States the same experience which other nations have had, so that our timber lands will pay a large net revenue over and above expenses, just as they do now in Germany, France, Austria-Hungary, and so on, ranging from \$1 to \$5 and \$6 per annum an acre, net. As a strictly business proposition, from a revenue point of view, there can be no doubt that these lands will pay.

One word in conclusion, Mr. Chairman. In my judgment not only will it pay from a business point of view, because of the timber, to acquire these lands, but the prevention of floods, the protection of water power, the protection of the soil, and especially the maintenance of navigable streams—each one of these alone would be sufficient to justify a purchase. The conclusion seems to me to be inevitable that as a strictly business proposition the enterprise which is here advocated is a good one.

Governor SMITH. Mr. Chairman, Mr. Pinchot is ready to answer now any questions of the committee, or it has been suggested that you take this matter up later and meet him, subject to your call at any time.

The CHAIRMAN. The committee understands that Mr. Pinchot can always be reached, and I think the sentiment of the committee this morning is that in view of the number of gentlemen who wish to be heard it will perhaps be better to postpone any cross-examination of Mr. Pinchot until later.

Mr. PINCHOT. That is all, Mr. Chairman.

[Great applause.]

STATEMENT OF MR. PHILIP W. AYRES.

Mr. AYRES. I am the forester of the Society for Protecting New Hampshire Forests and for Dartmouth College, besides representing some other interests in the forests of my State. The college tract is one of 26,000 acres, located in the White Mountain region. I am asked to speak this morning, possibly because I am a forester not in the Forest Service, one who has seen something of the conditions in the southern mountains, and very much more of the conditions in the northern mountains. It is possible that what I say may therefore be somewhat typical of a situation at both ends of the mountain chain.

I wish to speak especially of the method of removing the timber and its wastefulness, and incidentally I have some figures about the White Mountain region which I will not read to the committee, but which cover the forested area of the White Mountains and the yields and stands in the different portions of them, the value of the stumpage and of the timber on those several watersheds, and particularly some tables with regard to the extension of the cutting of spruce, which is limited in area, and upon which the supply of newspaper material throughout the entire United States depends. We feel that the White Mountains in this respect differ from the southern mountains, in that they produce a material which at present is limited in the area of its growth, and which is used universally through the country: and that the White Mountains, with the areas immediately adjoining in the other States, ship their product, the spruce pulp, to all parts of the United States; and if the waste of the spruce timber

continues as it has in the last few years, the entire country must suffer in that respect.

I will be glad to answer any questions, and I will submit these figures and file them to go with my statement.

The method of cutting timber on the mountain slopes is the most destructive possible. The growth of the timber on the mountain sides is such that when a portion of the trees are removed, the rest of them are likely to topple over with the heavy wind. The soil on the mountain sides is thin, and the growth is slow, the summers are short and cold, the elevation being between 3,000 and 4,000 feet, and with the pure spruce stands in that mountain region the growth is such that it requires one hundred and twenty-five years for a spruce tree to become 6 inches in diameter, which is the smallest merchantable size. These trees are swept off in their entirety, and although the operators do not use the entire amount of the timber, sometimes using only one-half or sometimes only one-fourth of it, the entire mountain side is stripped in order that the trees which are of sufficient size may roll over their prostrate neighbors to get down to the logging slopes; so that one-fourth to three-quarters of the forest is needlessly destroyed in order that the logs may be gotten out more easily. The Forest Service has prepared two albums, one of the Appalachian region and one of the White Mountain region, showing the methods of logging in these mountains. These albums are here before you, and these pictures show the perfect, clean, razor-like cutting off of the mountains, and they are indicative, they are entirely typical of the Northern States and of the Southern States, and the results are simply alarming. I believe I am not inclined to make extreme statements, but let me prove my point. In the first place, it is almost invariable that fire follows the debris which is left in such great quantities on the mountain side. Even if fire does not follow, the exposure to the sun of the roots of the trees that remain and of their stems kills them off, so the fact remains that there are no trees whatever over very large areas.

The CHAIRMAN. Has any State, to your knowledge, ever attempted to prevent by legislation such wasteful lumbering?

Mr. AYRES. I believe that it has not. There are many individuals that have done it. There are many of our States which now have forestry commissions and State foresters which endeavor to get at their individual owners and prevent this. There are States like New York, Pennsylvania, and Michigan and other States which own forest tracts which are put in proper forest management. But I know of no legislation in any State which undertakes to prevent the individual from doing what he will with his own land. When fire follows in this condition it burns up the soil, because on the mountain sides the soil is largely of vegetable origin and it is as inflammable as the timber, and we have pictures here to show you gentlemen the bare rock slopes of our mountains of the North, and the same will be shown you as to the South, where for stretches of 35,000 acres there is practically no growth. Take the Zealand Valley of New Hampshire, which has been called by a gentleman of the Forest Service "Death Valley," which was burned over once about twenty years ago and once in the summer of 1903, which was a very dry summer, and we find in the photographs no evidence of any vegetation whatever over large areas, and where there is vegetation it is quite likely to be

the little cherry poles which hold the ground without any commercial return in growth of valuable timber. A fire puts back the growth on the mountain sides, with the adverse conditions I have mentioned, from one hundred to three hundred years, and in many places, where the soil erodes away, it will be impossible to get a new forest until another ice age shall come and establish the beginnings of new fertility.

These are the pictures of the country where fire twenty years ago destroyed the forests as you see, large trees, with no growth whatever to follow. I believe that this is typical of both regions, and I should like to conclude by adding one word with regard to the Southern Appalachian Mountains, which is this, that as severely as we suffer in the White Mountains from erosion, and severely as we suffer from the streams going over our meadows and farms, this kind of injury is much more severe in the southern region. But I fear that I am trespassing on a subject that belongs to another.

These tables I have here will show you facts with regard to the spruce and hardwoods of the White Mountains, on which the country is dependent for its supply of paper.

Mr. WEEKS. Those photographs you will leave with the committee?

Mr. AYRES. I would be glad if these photographs could be made a part of the record.

The CHAIRMAN. They will be made a part of the files of the committee. We can hardly promise that they will be made a part of the record.

Governor SMITH. Mr. Chairman, I would like to present Dr. I. C. White.

STATEMENT OF MR. I. C. WHITE, STATE GEOLOGIST OF WEST VIRGINIA.

Mr. WHITE. Mr. Chairman and gentlemen of the committee, West Virginia is not alone interested in this forest project. All the States which are drained by the Ohio, and I might say the Mississippi also, are equally interested. Our State board of trade, representing all the business organizations of the State, practically all of them, has adopted resolutions in favor of this project. I shall call the attention of the committee especially to the importance of the drainage problem. You are all aware of the importance of Pittsburg, which lies just north of this point [indicating on map] in the commercial interests of the country. It has been stated that its commerce amounts to more than that of any other four cities of the world; that the commerce of London, Liverpool, New York, and Hamburg, all of them combined, is not equal to that which passes through the gates of Pittsburg, and that is due primarily to one river, the Monongahela, which with its tributaries, the Cheat and the Youghiogeny, rises in the mountain area of West Virginia, which this forest reserve would include, that forms the watershed that supplies the river.

As you are all aware, through the Rivers and Harbors Committee of Congress, through its appropriations, millions of dollars have been and are being expended to improve the navigation of not only the Monongahela, but the Ohio, into which it drains. It has recently been proposed to spend \$50,000,000, to ask Congress for \$50,000,000

at this session, by many States of the Union, not one State, but a body of people representing from 20 to 30 States. It is proposed to spend that amount of money for the improvement of navigation for the industrial welfare of the country. I wish to call the attention of the committee to the fact that several great river systems take their rise in this central portion of West Virginia, in the Appalachian field, which feed the Ohio. First, there is the Monongahela, with its great tributaries the Cheat and the Youghiogeny. There is the Potomac also coming from the same watershed, and also the Little Kanawha, and the Great Kanawha, and the Guyandot, and the Tug and Big Sandy. They rise along in this region where it is proposed to establish this park, in a high mountainous country, where the rock composing it is largely sandstone, sandy material which is not suitable for agriculture, and that is the reason there is so much green in that portion of the Appalachian field, as shown on this map. You never see much agriculture where the rock is conglomerate and sandstone; it is impossible; but it forms the best possible storage reservoir. The water falling on porous rock like sandstone sinks into it, if it has a chance to do so, as it has when it is covered by forest growth, and it is held and put forth in springs, so as to keep up the rivers.

Now, what is the use of Congress spending millions in damming these streams to make navigation possible if they are going to let the sources of these streams dry up? And that is what is going to happen. Even now, when we have a drought, there is hardly water enough in the Monongahela to lock the vessels through, and of course the summer season, when you have a drought, is a very important season of navigation. Another reason why this park proposition should go through is because of the great forest fires which sweep over that country and destroy the forest. There is no one to look after them. Millions and millions of young trees, spruce for instance, are there ready to spring into life when the original forest is taken away, and they would do so were it not for these fires. There are a few settlers in that region, but they are interested more in young shoots for pasturage than anything else. They often set a fire and destroy hundreds of thousands of dollars' worth of trees simply to get a little more pasturage for their cattle; so without Government supervision or some authority it is impossible to preserve those forests. There are thousands and thousands of acres where the cut of spruce would average from 50,000 to 100,000 feet per acre that has been utterly destroyed, and they never come up again because the young are killed off entirely. You can see the importance of this great river system through all that region, extending from Pennsylvania clear down into Kentucky and North Carolina, and if this committee can do anything to preserve this great belt of timber and at the same time preserve the water supply, which will keep up the navigation of these rivers and make these dams which cost so much money, and which are so vital to the transportation interests of the country, useful for all time, they will certainly deserve the gratitude of all posterity. [Applause.]

Governor SMITH. I wish to ask Mr. Dumaine to come next. It was not intended to ask him next, but I understand that he desires to come next.

STATEMENT OF MR. FREDERICK C. DUMAINE.

Mr. DUMAINE. Mr. Chairman and gentlemen, I appear here at the request of his excellency the governor of Massachusetts, who was unable to appear owing to imperative official engagements. He has appeared before this committee in favor of this proposition, and he has great interest in this matter.

I also represent Mr. Theophilus Parsons, the president of the Arkwright Club, which comprises a very large majority of the cotton manufacturers of New England, and directly I appear as the representative of the Amoskeag Manufacturing Company, a cotton milling concern situated in Manchester, N. H., on the Merrimac River. This concern runs 500,000 cotton spindles and about 35,000 worsted spindles, and employs about 25,000 hands.

I want to correct a statement which has been made with reference to me to the effect that I appear here as an expert. I am not an expert in any sense of the word, but am simply a business man, and I wish to call your attention to only one or two points, as this affects the business end of a cotton mill. This particular mill has 110 acres of floor space. Now if, as some of these men learned in forestry have said, you have only ten or twelve years' supply of hard wood it is of course a very serious question for us where we are going to get the floorings, for instance, to provide for that one thing in our mills.

Then, if you like to multiply our demand, considering the other cotton mills in the country, which are all obliged to have the same requirements, you can figure for yourselves how much hard-wood lumber is necessary for that one thing. To box the products of these great cotton mills is getting to be a very serious problem. The cost has risen nearly 100 per cent in the last ten years, perhaps; but beyond that we have the question of supply, and in this one mill of ours it takes about 6,000,000 feet of lumber per annum to box the product, and there seems to be no other way to pack the output. These mills, as you know, are largely situated on the banks of the rivers, and in times of great freshets the destruction to property is very great. In two years we lost between \$400,000 and \$500,000 in that way.

Mr. WEEKS. You mean the Amoskeag Company alone?

Mr. DUMAINE. Yes; the Amoskeag Company alone. I have prepared here a chart which will show the up and down of the Merrimac River. If that will be of any use to your committee, I will be glad to leave it with you. About the time, as we understand it, when the forests were being cut down very largely, the river rose and fell to great extremes, and I have in connection with that a memorandum of the water fall. These charts, I might explain, are merely from observations taken at our gatehouse at 5 o'clock every night since the year 1880, and the water fall is taken the same way. I will not go into that at all, but I think you will find one or two marks that show the extreme freshets and the years in which we met with great losses.

The CHAIRMAN. Can you tell us when these freshets first began to be dangerous and destructive?

Mr. DUMAINE. I think along about 1895, 1896, and 1897 you will find the greatest variation. The lines were pretty good before, and they have been growing better ever since. Of course the destruction

of the mountain forests would be to us most disastrous, because the soils would be destroyed, and we would get no second growth there.

Mr. HASKINS. In other words, there is a larger flow of water in the spring, when the heavy snows of the winter are melting, and there is a diminution in the summer season?

Mr. DUMAINE. Yes; I think the lines on the chart are very simple, and you can see it for yourselves.

Mr. WEEKS. Does the Amoskeag Company use auxiliary power?

Mr. DUMAINE. I will answer that by explaining a little bit. To go back, the Merrimac River has about 60,000 developed horsepower, of which the Amoskeag Company owns the power at Manchester, which runs from 5,000 to 15,000, perhaps an average of 12,000 horsepower, at that point. It is absolutely essential for this company to have a steam outfit, which of course at times we do not use at all, but at high freshets we have to use it and at very low water we have to use it, so that we have to be supplied with an almost complete steam outfit in order to be able to run the mill at all times. Does that answer your question?

Mr. WEEKS. Yes; but have you determined to how much greater extent you have to use auxiliary power in proportion to your business than you did ten or fifteen years ago?

Mr. DUMAINE. I do not know that I can determine that, exactly. Of course we are increasing our power all the time. We have used up all the water power that is there. The mill originally started in 1831, and the only power they had then was water power. The mills were warmed by stoves. As the mills have grown we have used a great deal more power than the water power from the river, and in addition to that we have to provide for at least 10,000 horsepower by steam power, owing entirely to the fluctuation of the river.

The CHAIRMAN. Did you first put in auxiliary power in order to get more power or in order to guard against the fluctuation of the stream?

Mr. DUMAINE. Originally it was to guard against the fluctuation of the river. There were times, and there have been times in my day, in fact before any one of the mills was supplied with auxiliary power, when I have known the mill to shut down in summer for lack of water power and in winter because there was too much water; so that where we have a mill which takes 2,000 horsepower to run, we have a 2,000-horsepower engine in addition to the water wheel.

Mr. COOK. From your long experience with this mill, which I believe is the largest mill in New England, what is necessary to enable you to run regularly without so much steam power?

Mr. DUMAINE. As I said in starting, I am not a river expert; but our men all believe that the regularity of the river would be materially improved and maintained if a continuous growth along the watersheds could be maintained. I thank you, Mr. Chairman. [Applause.]

STATEMENT OF MR. A. M. SCHOEN, REPRESENTING THE AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS.

Mr. SCHOEN. Mr. Chairman and gentlemen, in referring to these resolutions of the American Institute of Electrical Engineers, for the information of those who may not be fully conversant with the scope

and functions of that body I will state that it is an organization of engineers free of any commercial connection at all, which covers the entire United States, with a membership of over 5,000 in this country and in foreign countries, including the principal engineers in this country and over a large section abroad. This institute held its first meeting at Asheville, N. C., something over three years ago. At that time the question of the protection of the headwaters of the streams through the perpetuation of the forests was brought up before the institute. A great number were skeptical of the bearing that the forests had on this subject, and it was only after considerable discussion and some illustrations of that section were brought out, they being in the heart of the Appalachians, that it was decided to put a resolution on the books instructing the president to appoint a committee which should investigate this subject and report back. This committee has been investigating for between three and four years, and as a result of that investigation and the reports made, the institute has very recently passed the resolutions which I presented here this morning. Those resolutions, of course, deal with the subject from the standpoint of power only, as the electrical engineers have no right to approach this subject from any other direction.

I regret that I am not able to say anything about the White Mountains, as I am not conversant with that section. Mr. Porter, of Boston, was to have been here to speak of them. But there are other gentlemen here who will speak on that section. In the South nearly all our streams from which we obtain power for cotton mills or other purposes take their rise in the Southern Appalachians, and the denudation of the forest growth on these slopes will necessarily affect the flow of these streams, and especially in its uniformity. When the forest is swept away there we have only the bare, naked rock underneath from which these waters run off, and we have already seen instances of the heavy floods that have resulted from these conditions. Less than fifteen years ago—I think I will be on the safe side in saying ten years ago—the electrical transmission of energy over long distances had not become an accomplished fact, and consequently very little interest had been taken in this subject. The railroads of the South are almost all ridge roads, in consequence of which the transportation facilities are at a distance from the streams. As a result of that, and the inability of the mill men to remove their products to advantage, the value of these water powers was very low until the electrical transmission of energy over long distances was accomplished. Since that time these values have gone up to an enormous extent.

The water powers are in great demand, and the percentage of power that is now available in that section is many times what it was previous to this electrical transmission development. In the South the rivers are used to transmit power for the use of the cotton mills. The principal streams that are utilized are in Georgia, North Carolina, and South Carolina, and some in Virginia and Tennessee and in Alabama, but not to so great an extent, and Kentucky and West Virginia have very valuable powers, but for those I was not able to obtain the data in the shape I desired. I wish to state that the data I have secured and presented here I have gotten from the engineers who have been making these surveys. The surveys made were on

the basis of power—that is, not only power available, but in such shape as to be desirable for development, and the percentage that is developed is small as compared with that which is available but not developed. I have not dealt here with powers smaller than 1,000-horsepower, nor with the power of the smaller tributaries, but have only taken up some of the larger rivers, which are of importance in that section of the country.

In going over that list I find that the Potomac River has 131,000 horsepower available and undeveloped, the Rappahannock 30,000 horsepower, which is projected and to be developed very shortly, the James River 23,000 developed near Richmond, and the available but undeveloped horsepower is very difficult to ascertain on account of the fact that the railroad runs very close to the bed of the river, that being a valley road, and a large development can not be effected without the consent of the railroad. The Appomattox River has 5,000 horsepower developed near Petersburg and 10,000 undeveloped, which will be developed at no late date; the Roanoke River, with 2,000 horsepower developed and 75,000 available; the Yadkin, with 87,000 horsepower developed and 80,000 available but undeveloped; the French Broad, with 6,000 developed and 20,000 available but undeveloped; the Catawba, with 105,000 developed from several powers down through South Carolina, and 145,000 available; the Broad, with 40,000 horsepower developed in the vicinity of Union, Spartanburg, and Columbia, and 60,000 horsepower available and undeveloped; the Saluda River, with 21,000 horsepower developed (about) and 40,000 horsepower undeveloped; the Savannah River, with 21,000 horsepower developed, 125,000 horsepower projected, and 25,000 horsepower available and undeveloped; the Chattahoochee, with 32,000 horsepower developed and 172,000 horsepower undeveloped; the Tallapoosa, with 10,000 horsepower developed and 20,000 undeveloped; the Coosa, with 101,000 horsepower undeveloped; the Tennessee, with 45,000 horsepower projected and 123,000 horsepower available but undeveloped; the Cumberland, with 25,000 horsepower available; the Duck River, with 10,000 horsepower undeveloped; Caney Creek, with 25,000 horsepower projected; the Tallulah River, with 12,000 horsepower projected; making a total of 352,000 horsepower developed and in operation, 327,000 horsepower projected, and 947,000 horsepower which is available but undeveloped.

This reduced to spindles at the mills gives us for the developed horsepower 14,080,000 spindles, with a net income of \$35,200,000, and for the other water powers which are available but undeveloped 48,780,000 spindles, with a net income of \$121,950,000. To replace these powers with steam, depending on the section and on the size of the plants and the character of the plants, would cost from \$30 to \$50 per horsepower per annum, I mean in the operation, making a difference on the present development of \$3,520,000 per annum to \$10,560,000 per annum, and on the basis of the entire power a difference of from \$16,260,000 to \$48,780,000 per annum.

The value of the present development, and this development has been figured on the basis of the sixty hours per week ordinarily used by the mill, and figured at the rate of \$20 per horsepower, which is the average rate charged the mills for this power developed, would

amount to \$7,040,000 under present development, or \$32,520,000 income to the power companies if the entire development was carried out.

As I have stated, these figures are taken on a very conservative basis. One of the engineers who has given his entire time and attention to the investigation and development of these properties estimates that if you take into consideration the entire available power through that section you will have 3,500,000 horsepower, which at \$20 per horsepower would mean a value of \$70,000,000 per year to the power companies having the development in hand. I have cut off anything further than just these figures, as I believe they will speak more plainly than anything I can say in any other direction.

Mr. POLLARD. When were these measurements made of these streams?

Mr. SCHOEN. These measurements have been made within the past four or five years; very recently.

Mr. POLLARD. Have you any figures showing the decrease in the amount of the available water power, comparing the water power previously existing, ten, fifteen, or twenty years ago, with what it is to-day?

Mr. SCHOEN. No, sir; I have not. At that time these powers were of too little value to make it worth while to estimate them.

Mr. POLLARD. But the available water power was there?

Mr. SCHOEN. The available water power was there. But what I want to say is this, that until the electrical transmission of power was accomplished it was not anywhere taken into consideration. People confined themselves to utilizing these water powers throughout the country, and building mills where they could get transportation facilities, and they put these mills right on the banks of streams.

Mr. POLLARD. You have no figures showing the decrease of available water power?

Mr. SCHOEN. No sir; I do not think there are any.

Mr. LEVER. What is your opinion as to that, just offhand?

Mr. SCHOEN. It is my opinion that the effect is very material in more than one way. In the first place, in the Southern Appalachians we have no lakes to hold back the water, to impound the water and hold it back as it is held in other sections of the country, and we can only rely on the forests to supply the governing effect that is necessary. The rains, which are torrential in this section, have been flooding and carrying down the debris with them, and that fact has been very well demonstrated in two or three matters to my knowledge. I was in Augusta recently with the Commissioner of Waterways and we examined some of the dirt that was being taken up by his dredge from the bottom of the canal. That soil proved beyond question that it was coming from up about the headwaters of the river. There was nothing in it that was anything like the soil down in that section; and in further talking with this gentleman he told me that he had found there had been more filling in of his lake and in his stream in the past eighteen months, since they had been cutting on the headwaters, than he had had previously in thirteen years. He stated that there had been more filling in that stream in the past eighteen months than in thirteen years previously. Furthermore, one of the engineers who had been making surveys on the headwaters stated that in looking for bench marks that had been established by the United States

Government he found that they had been covered 5 feet deep with sand, and all of this filling in had been done in the past three years, since the cutting had become heavy in that section of the mountains.

I have letters from some of the managers and superintendents of the power companies in the South. One states that in five years his pondage—that is, the water held back by the dam to maintain as much uniformity of flow to the water wheels as possible—has filled in to such an extent as to decrease his power from 15 to 25 per cent. Another one states that in two years his dam has filled to such an extent as to decrease his power from 5 to 10 per cent, and another writes that in three years his pond has filled from 8 to 10 feet. All of this shows conclusively that, as this cutting goes on, the heavy waters are bringing down with them this debris from this section, and in this case, as I have stated, such action had not occurred previous to the heavy cuts being started on those slopes.

Mr. POLLARD. Are you familiar with the forest conditions and with the methods employed by the forest men in your State?

Mr. SCHOEN. I do not think that they had any particular forest protection up there at all. I do not know of any.

Mr. POLLARD. You do not know whether the State has done anything along the line of suggesting to the timbermen that they should adopt more economical methods?

Mr. SCHOEN. I think not. The suggestion has been made—I do not know whether by the State forester or the professor of forestry at the University of Georgia. He has made a suggestion that the state should make recommendations of that kind, but he believes, I think, with all the rest of us, that it will be impossible to really accomplish a great deal unless the National Government acts, because these streams take their rise all through that section; some of them have their tributaries in three or four States, and it would be very difficult to reach this matter by the action of any single State.

Mr. POLLARD. If each State should take similar action with that end in view, looking to the protection of the forests from fires and also policing them to protect them from devastation by fires, would you not reach the same result as if the Federal Government took it in charge?

Mr. SCHOEN. I do not think they could get the same cooperation with the State.

Mr. POLLARD. Do you not think the States would cooperate just as they would with the General Government?

Mr. SCHOEN. I think it would be very difficult. There would be more or less jealousy and friction.

Mr. WEEKS. You referred to 14,000,000 spindles, did you not?

Mr. SCHOEN. I referred to that number of spindles for the present development in electric power.

Mr. WEEKS. Do you mean that many run by water power only, or by the water power and electric power also?

Mr. SCHOEN. I referred to the electric plants. Some of them have put in auxiliary power; some of them did not, but I think most of them have found it necessary. I thank you, gentlemen. [Applause.]

Governor SMITH. I will call on Mr. Lee, of North Carolina, next. Will you please state first what your business is, Mr. Lee, and what your connections are now?

STATEMENT OF MR. W. S. LEE, CHIEF ENGINEER OF THE SOUTHERN POWER COMPANY.

Mr. LEE. I am from Charlotte, N. C. I represent the State of North Carolina, and also am chief engineer of the Southern Power Company.

Mr. Chairman, I simply wish to discuss this matter more in detail than it has been discussed in regard to the water-power situation. The gentleman who has just preceded me, like others, has tried to explain to you how much water power was situated in the vicinity of the Appalachian Range. All of you gentlemen know that those mountains are from 1,500 to 2,000 feet above sea level. You can look at that map and see numberless rivers running down and you know there has got to be fall to get down to the coast, and fall means water power. Now, we may stand here all day and present figures to you gentlemen telling you how much it is or where it is, and all that. I simply come before you as a practical operating and construction engineer who has been in this work for the past twelve years in the South, and I am going to confine my talk to a very small area, and tell you just what I have observed, just what we have been doing, what we are doing there, and say to you that this is a sample of what is going on or should go on. You see that circuit around that green spot on this map [indicating on map]. The company I am with, the Southern Power Company, operates in this territory here.

The CHAIRMAN. When you say "this territory here," that means nothing in print. Please tell us definitely just where you mean.

Mr. LEE. Upper South Carolina and lower North Carolina, principally on the Catawba River. We have one plant which we are constructing on the Broad River, which is about 60 miles west of the Catawba River. This work was begun about five years ago. One of these plants has been in operation for three years. We put into commission last April a second one. We are now at work on two others, one on the Catawba and one on the Broad. We hope to have one of these in commission by September of this year, and the other will follow about six months later. The total horsepower which we are furnishing to-day aggregates about 38,000 horsepower. We are furnishing power to 26 towns, 78 cotton mills, and various other small enterprises for motors of different sizes for other manufacturing. In our work in connection with this particular company, which has only been in existence five or six years, we have encountered a great many problems, due to this enormous run-off or to very low water in our dry time. We have found in constructing these plants that we have had to encounter these floods which damaged our dams or our plants, in the equipment or construction of them. We have found that we have had to design these plants much heavier; I mean the sections of our dams are built much larger to take care of these enormous floods which we are apt to have at any time.

We have also found that year after year we are gradually getting these floods heavier, putting the water that is precipitated on this drainage area down there in a shorter period, and the result is that we are offering to our consumers three classes of power. We have one class of power that we term primary—that is, a power that we feel

we can sell for twelve months in the year. We have our secondary power which we will furnish for ten months or eight months, and it has gotten so now that we dare not sell over 60 per cent of what we should sell against one of these streams, for continuous delivery. This depression may not occur every year, it may not last more than ten days at a time; but when you are furnishing power to that many industries that employ a great many hands, and many of those mills have no steam plants, you are obliged to guard against overselling, and consequently we dare not sell over 60 per cent of what we should against these streams.

Another great damage that is being done to these water powers is by the erosion or sanding up of our ponds. We have in the completed system eleven plants. It was our idea to design these plants so that they would be electrically connected—that is, there would be trunk lines or wires between all the plants, and we can operate any mill on the system from any one plant. Our customer does not know where he gets his power from. By that means we are able to use that same plant on the same area or on different rivers or areas, and take advantage of the conditions of rainfall, and so forth; but we are met with the condition that our ponds are sanding up very fast, and as those ponds fill up we lose that storage, and we come right down again to the river. This has become so alarming in the last few years that our company is designing a big steam plant to supplement the water power. We are designing a plant from which the lines radiate, of 50,000-horsepower capacity, which will cost us \$2,000,000 to build, and which will be needed practically four or five months in the year.

We have been selling that power at about half what it could be made for by steam. This additional expense that we are going to in supplementing our water power with steam power is going to increase our rates. Our men who are financing this are going to ask for a fair return on their money, and it is going to mean that the advantages those people have had by reason of having that cheaper power will in part disappear. They have got to pay a fair return on these investments that will guarantee them their power. In other words, where we have been selling this power for \$15 or \$20 per horsepower we are going to have to ask from \$20 to \$25, although the power in that section, as we have carefully estimated, is costing those various mills about \$35 to \$40 per horsepower per annum, based on a day run of ten hours a day.

There are a good many mills there that are electrically driven by a small plant built on one of these streams, transmitting power to the mill. We have to-day contracts with several of these mills by which we are supplementing their power to a greater or less extent, where two years ago they had all the power they wanted. We have one mill that has been in operation for perhaps fifteen years. This last year they have contracted with us for power to supplement their power, and they state further that they own water power there, but that the variation of this stream, it being a rather small one, is so great that they do not feel warranted in making this expenditure on such a small stream.

There are a good many more points I would like to discuss with you, gentlemen, but we have a great many men to be heard, and that is all I will say.

Governor SMITH. What has caused this condition?

Mr. LEE. There is no question but the cause of this variation of flow and the sanding up of streams is the denuding of the hills or the mountain sides of their forests.

Mr. COCKS. When these dams fill up with silt, are they useless then, or is it practical to clean them out?

Mr. LEE. It is impractical to clean them out. They can be used by only using the run of the river. We lose our storage capacity.

Mr. COCKS. There is no way by which the dam could be cleaned out occasionally?

Mr. LEE. I have let off some of them to see what the effect would be. You can get a head of 35 or 40 feet, and if you have a gate through the dam as far as from here to that door, 50 feet from you, the sand will bank up and take a 45° angle. The current is not enough to draw that more than 50 feet from you.

Mr. COCKS. At the dam at Assouan they have an opening that is continuous all the way across the whole width of the dam.

Mr. LEE. Yes.

Mr. COCKS. If you did clean out your dam, then you would only silt up some fellow below you?

Mr. LEE. You would pass it to the next man below.

Mr. WEEKS. And it would probably result finally in an appropriation to deepen the stream for navigation?

Mr. LEE. Yes, and then the Government would build jetties at the mouth of the river to try and push it out into the ocean. (Laughter and applause.)

Mr. WEEKS. You say that mills which two years ago had sufficient power of their own are now contracting with you for additional power?

Mr. LEE. Yes.

Mr. WEEKS. On the same volume of business?

Mr. LEE. Yes.

Mr. WEEKS. Have you made any estimate of the necessary additional power on account of the cutting off of the forests in the last ten years or five years; have you any proportional figures on that?

Mr. LEE. That can not be estimated unless you take some specific case. We estimate with our system which I referred to we should prepare for practically 40 per cent.

Mr. WEEKS. You are an expert, and I simply want your judgment; that is all.

Mr. LEE. Yes, sir. That will run anywhere from 15 to 50 per cent, the variation in the last ten years, with the same volume of business.

Governor SMITH. For how long?

Mr. LEE. The last ten years. I mean by that that the depressed flow, our low-water peak, will vary from 15 to 50 per cent of what it was ten years ago.

Mr. WEEKS. That is what I wanted to get.

Mr. LEE. We are getting the same water down the streams, but it is coming in a bunch.

Governor SMITH. And to what do you attribute that?

Mr. LEE. Absolutely, sir, to that deforestation, denuding the hills of the sponge that has been holding the water there for a short time.

Mr. HAWLEY. How much of the forest in that section has been cut down in the last few years?

Mr. LEE. I could not answer that very accurately. I trust that some of the gentlemen who follow me can give you exact figures on that area.

Mr. LEVER. The cutting has been increasing, however, every year for the last ten years?

Mr. LEE. Yes, sir.

Governor SMITH. I will ask Professor Swaine, of the Massachusetts Institute of Technology, to come next.

STATEMENT OF G. F. SWAINE, PROFESSOR OF CIVIL ENGINEERING AT THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY, MEMBER OF THE BOSTON DRAINAGE COMMISSION, AND ENGINEER OF THE MASSACHUSETTS RAILROAD COMMISSION.

Mr. SWAINE. Perhaps it may be of interest to state to this committee that in 1880 the first census of the water powers of the country was taken, under Gen. Francis A. Walker, and I was expert on that census, and in carrying out my duties in connection with that work I traveled over and examined the streams of the Atlantic watershed from Florida to New York State, and also in certain parts of New England. Since that time no census of the water powers has been taken, but I hope one will be taken in the next census.

I presented a few moments ago some resolutions from the American Society of Civil Engineers, and I would like to state that the society is the representative society of civil engineers of this country, comprising some 4,500 members from all parts of the United States and from foreign countries. I wish to emphasize the fact that the society has always been most conservative in questions of this kind, and has never, to my knowledge, or to the knowledge of the secretary, memorialized Congress in any way. The committee has heard from Mr. Pinchot and Mr. Ayres very interesting facts with reference to the destruction of the forests. I should like to say that the engineers, so far as I can speak for them, are very apprehensive with reference to the question of the timber supply. They realize that, as Mr. Pinchot has said, a timber famine is in sight, and they are asking themselves what they shall do ten or fifteen years from now, when the price of timber rises still higher and timber is still more difficult to obtain.

As the members of the committee are well aware, engineers have been endeavoring recently to find substitutes for timber, and concrete has come into use very largely for purposes for which timber was formerly used. But, notwithstanding that, timber is being used steadily and it is an extremely important question to engineers. The question of the effect of this bill and the desirability of its passage are considered by engineers from these two points of view: the point of view of the timber supply and the point of view of the regulation of the rivers.

Now, the regulation of the rivers affects the water powers, the preservation of the soil, and the navigation of the streams. The destruction of the forests is a very serious element as affecting the regulation of the flow of the streams. There is no difference of opinion among scientists who have studied this question. Every meteorologist, every forester, every engineer, who has studied the question of the effect of the forests upon the flow of the streams, emphasizes the

effect of the forest cover in regulating the flow, in making it more uniform from month to month during the year, and in diminishing, on the whole, the average violence and duration of freshets, and in increasing the flow during the low period of the year.

There is no difference of opinion, and it is very easy to see the cause—the reason why forests have this effect. It is simply because the forest cover accumulates a crust of soil and a collection of humus, of vegetable mold, or leaves; the roots of the trees penetrate this mold and this soil, and the water which falls, therefore, is prevented from running off swiftly into the streams, but is held back and percolates into the soil and is given out later in the spring into the streams, so that these forests regulate the flow; instead of allowing the water which falls to run off swiftly into the streams, causing violent freshets, they tend to hold it back. Of course, we shall always have freshets; nothing that we can do can prevent the variation of flow from month to month and the occasional occurrence of freshets. There are circumstances which we can not control, such as the distribution of the rainfall. Whether it comes in the winter time indirectly, or whether it comes in the summer time directly varies a great deal from year to year. Sometimes a great proportion of the rainfall will come in the summer, when the evaporation is large, and a small amount in the winter; sometimes a large amount will come in the winter and fall in the form of snow and be carried off in freshets in the spring. But there are two agencies which we can control which will regulate the flow; the first is, we can control the forests and preserve them, and the second is, we can, in some cases, construct reservoirs which will hold back the surplus water and dispense it at periods of low water. The construction of reservoirs depends on topographical conditions, and is not always possible. It is a very adequate and very powerful means of regulating the flow, and it is one the Reclamation Service is carrying out in the West, as you know, in the great projects they have, the great irrigation projects; but the preservation of the forests is something that can be done, and something that the engineers think ought to be done.

With reference to water power I need hardly emphasize the importance of that, but with reference to New England I want to emphasize it. New England has few natural resources. It has no mines of precious metals; it has no copper; it has no coal; it has no iron ore; it has no agriculture; it has its forests, its streams, and its manufactures. Now, the manufactures of New England grew up because of the water power. The city of Lowell, the city of Lawrence, were built because there were large water powers there on the streams, and all along our New England streams these large cities like Lawrence and Lowell and Manchester and Lewiston and Biddeford and others, Holyoke, Turners Falls, Bellows Falls, have grown up largely on account of the presence there of these large water powers. As I have said, there has been no census of water powers in this country since 1880, but it is estimated, perhaps with reasonable accuracy, that on the streams draining the White Mountain region, which it is proposed by the bill before Congress to preserve as a natural forest—on the streams draining that area it is estimated that some 250,000 horsepower is developed and, perhaps, an equal amount undeveloped. So, there we have a very large amount of power in

that section of the country. Anything which will increase the regularity of the flow of our streams is of great importance, for the benefit of that water power. If our streams become more irregular, steam power has got to be used more and more to supplement that water power, and every day that that steam power is used is an added expense to our mills. Our New England manufactures, as many of you, of course, know, have met with competition from other parts of the country, and especially from the South, and many of them have established branch mills in the South for the manufacture of the coarser grades of goods. The maintenance of our water powers and the possibility of making our goods cheaply are of great importance to all our industries.

Another effect of the forests is in holding back the winter snow. Not only do they hold back the summer rains and allow them to percolate into the ground, but they hold back the winter snows, prevent them from evaporating, keep the ground under from freezing as deeply as it would, perhaps keep it from freezing at all; so that when the snows do melt the waters percolate into the ground much more easily, and instead of running off over the steep slopes are discharged into the springs.

Mr. HASKINS. It does not melt as rapidly.

Mr. SWAINE. No, sir. From all these points of view the preservation of the forests, and especially the preservation of the forests on the steep mountain slopes, is of the utmost importance. If rain falls on a level it, perhaps will percolate into the ground, especially if it is plowed, and not alone rain, but snow; but if rain falls or snow melts on these steep mountain slopes it requires the forest cover to hold it back, and without that cover it will run off with great rapidity and carry off the humus in the earth which may be there, and, therefore, tends to render the mountains barren. This process, of course, is a very gradual process; it does not take place all at once, but it is a certain process, and the preservation of those mountains is a matter of importance, of practical importance, because every year that is allowed to elapse before they are preserved; every year that is allowed to elapse during which they may be deforested as they are being deforested, as Mr. Ayres has described to you, cut clean, from 25 to 75 per cent of good timber allowed to rot because it is not needed by the parties doing the cutting; every year that is allowed to pass causes a devastation and destruction which will take decades to replace, if some of it can ever be replaced.

Governor SMITH. At that point I would like to ask you to address yourself to the committee on the increased devastation on account of the rapidity of the flow of the water. Is the power value of the water affected by the rapidity of the flow?

Mr. SWAINE. Most assuredly; yes, sir. The carrying power of the water depends upon the flow, and where it flows slowly it will not take up any earthy matters. The power increases, of course, as the velocity increases. On these steep slopes it will carry away the humus or loam with very great rapidity. Therefore, it is in relation to these high slopes, the mountain slopes, which are only suitable for forests, that the devastation of the forests and the reforesting are of the utmost importance. From the point of view of the preservation of the soil, I have already referred to that briefly. I will simply say

that, in the course of time, if these mountain forests are destroyed, the earth will be carried away from the mountain slopes. the soil will be carried down into the valleys, the freshets on our streams will increase in violence, and our streams will be rendered less navigable and our milldams will be silted up to a greater or less degree. I have some figures here which have been prepared by the Department of Agriculture with reference to the sums which have been expended by the Government on streams draining the White Mountain reservation as it is proposed, and the sums which have been expended by the Government for the improvement of navigation, which I should like to submit to the committee. These figures give the number of miles of navigable water in these streams and the appropriations by the Government from 1790 to 1907, which amount to \$2,577,000. a total cost of improvement per mile of about \$17,000. The striking figure is the average tonnage on the river in 1905 for each dollar spent by the Government for improvement, which is just about half a ton; half a ton was carried on the rivers in 1906 for each dollar the Government had spent on improvements from 1790 to 1907.

(The table referred to will be found printed in full in the Appendix.)

I think the engineers are now alive to this matter and are looking to Congress to take some action which will preserve these powers from deterioration, as they certainly will deteriorate, and which will preserve our rivers from deterioration, as they certainly will deteriorate if the destruction of the forests on the upper slopes, especially the steep mountain slopes, is allowed to go on. If this committee can take some action to that end, it will deserve the eulogies of the engineering profession.

Mr. WEEKS. Just one question, Mr. Swaine. The last speaker, Mr. Lee, stated, if I understood him correctly, that on account of the increased flow of water at some particular time it was necessary to add strength to a dam for any given purpose. Do you coincide with that statement?

Mr. SWAINE. Of course a dam has to be built to resist the highest water, the greatest pressure than can be brought to bear upon it. The more severe the freshets are the greater the force of the water, the stronger the dams, and the more difficult it is to construct them.

Mr. WEEKS. If you were going to build a dam in the Merrimac River, would you build that dam any stronger than you would have ten years ago?

Mr. SWAINE. I think likely.

Mr. WEEKS. Could you give any estimate of the proportional increase in strength?

Mr. SWAINE. No; it would depend so much on circumstances. The dam might be very easy to build or it might be very difficult to build, so I couldn't give any definite estimate of the increased cost.

Mr. WEEKS. I would like to ask Mr. Lee that question after Professor Swaine has finished.

Mr. COLE. How much has water power that can be utilized been diminished in the last twenty years, since that estimate you made in 1880?

Mr. SWAINE. That I could not tell you, sir. There has been no census taken, and measurements of that kind are difficult to obtain or difficult to discuss. It is difficult to tell just what the effect of the

forest is, because, as I have said, there are other elements which make a stream variable. Nothing that we could do would make a stream lack the possibility or the certainty of freshets.

Mr. COLE. Do you know to what extent deforestation has taken place in the last twenty years?

Mr. SWAINE. I do not know the percentage of the White Mountain region which has been cut over, but I do know that a large area there has been entirely denuded.

Mr. HAWLEY. Is that the watershed or the lower ranges?

Mr. SWAINE. That is the watershed area.

Mr. HAWLEY. Up to the summits of some of the mountains?

Mr. SWAINE. Up to the summits of some of the mountains; yes, sir.

Mr. LEVER. How long do you estimate that it will take to replace these forests?

Mr. SWAINE. Not being a forester, I could not tell you.

Mr. POLLARD. I should like to ask you, have you made a survey of the rivers in your own State and made a comparison of the volume of water now to what it was in 1880?

Mr. SWAINE. No, sir; I have not. The rivers in my own State, Massachusetts, are small. The rivers which are large, like the Connecticut, are rivers which rise in New Hampshire or Vermont and flow through the State.

Mr. POLLARD. You have no way of determining the relative amount of the water power now to what it was in 1880?

Mr. SWAINE. No, sir; I do not think there are any figures which could be given authoritatively on the subject.

Mr. LEVER. It is your opinion that there has been an actual decrease in the waters during that time?

Mr. SWAINE. I believe that on account of the destruction of forests which has taken place, the flow has been rendered more irregular; I think there is no question about that. The destruction of the forests and this vegetable mold, the washing away of it, must make the flow of the streams more irregular than it otherwise would be.

Mr. LEVER. Are you able to tell the committee the amount of capital invested on those rivers?

Mr. SWAINE. I have some figures on that from the census of 1900 which show that on the four principal streams draining the White Mountain region there was an aggregate capital of \$300,000,000 invested. Since that time some other large powers have been developed, and it is probably now in the neighborhood of or over \$400,000,000. The census of 1900 gave \$300,000,000 with an output of about \$331,000,000, and the operators employed 183,000, with annual wages of \$57,000,000.

Mr. COLE. Is there any general complaint on the part of these operators on the question of water power?

Mr. SWAINE. I believe there is. I hear complaints continually that the streams are irregular. Of course, it is very difficult in the case of any given stream to tell just what effect the deforestation has had on that particular watershed. It depends so much on whether the watershed has stopped the flood, or how much area is affected. We must treat this thing, I think, in a general way. There is no question that the preservation of the forests is of the utmost importance. The experience of foreign countries shows that. France, Switzerland, and other foreign countries have gone through very serious experiences

in regard to their streams. They have gone through very serious measures to attempt to repair the losses. If I am not mistaken, in Switzerland all the high mountain slopes are under the control of the state and the forester of the state.

Mr. LEVER. Do you find the manufacturers of New England favorable to the passage of these bills?

Mr. SWAINE. I do, sir. I have not met a single individual in New England who is not favorable, who is not earnestly in favor of the passage of these bills, manufacturers, engineers, and everybody else.

Mr. POLLARD. I should like to ask the gentleman his opinion on another matter. Do you know whether the State of Massachusetts, or any of the other New England States, have taken any steps, through their legislatures, looking toward the protection of the forests from fires in any way, or introduced methods of regulation to the end of directing the attention of the foresters to the more improved and advanced methods for handling their timber in order to avoid the great loss that is now sustained, such as has been described to the committee to-day?

Mr. SWAINE. I am not aware that they have. I wish they would. It takes some time to wake people up to the importance of things like this.

Mr. COLE. Is it not a fact that in Maine they have a complete control in regard to fires?

Mr. SWAINE. I am not informed as to that. Mr. Ayres can tell you all about that, probably. I am not aware of any such control.

Mr. WEEKS. Mr. Law, did you understand the question I wanted to ask you?

Mr. LAW. Yes, sir. If I understood you correctly, you asked what increase in the yardage we put in these dams to guard against those excessive floods?

Mr. WEEKS. Yes.

Mr. LAW. I will say that the Southern Power Company constructs and designs all dams up to 40 feet high, but it varies, of course, from 40 to 75 feet high. Twenty-five per cent increase of our construction is designed on that basis.

Mr. WEEKS. Does that mean in cost?

Mr. LAW. In cost; yes, sir.

Mr. WEEKS. To what do you assign that, to what cause?

Mr. LAW. Well, we make a very careful examination of this flood discharge that is being changed every year, and we can not afford to have this structure wrecked by what is going to be done by the United States in the next ten or twenty years. [Applause.]

Governor SMITH. I would like, before you adjourn, to give the secretary the copies of the resolutions and acts of North Carolina, Maine, Tennessee, New Hampshire, South Carolina, Virginia, and Alabama, at different sessions of the legislature, acting upon this subject, and amending this legislation and tendering the cooperation of the States in case the Government first takes hold of the problem.

The CHAIRMAN. Without objection they may be incorporated in the record.

Mr. HASKINS. Governor Smith, has anyone on your list of speakers any estimates of the probable cost and the number of acres to be purchased?

Governor SMITH. My own view of that matter is that when the Government begins the work and makes the purchase, substantially indicating national interest in the project, that it will be taken up by the States locally and put through.

Mr. POLLARD. By the way of purchase?

Governor SMITH. By the way of purchase, or by control and regulation. I feel sure that there will be immediate cooperation of the States after it is assured that this is a great national project, but we do not feel, in Georgia, that we can handle it at all. Our streams are dependent on North Carolina largely, and we can not handle it locally. North Carolina does not want to handle it, because the enormous expense on her would be for the benefit of South Carolina and Georgia and States below her. There is a central, national feature to it, and when the Government takes hold of it and carries out the plan of this bill I have not a question that there will be supplemental work then following by the States and by individuals, reaching on down to all the States interested in the streams.

The CHAIRMAN. I would like to present Representative Gillett, of the State of Massachusetts, who desires to be heard for a few moments at this time on account of committee engagements that make it inconvenient for him to return later.

Mr. GILLETT. I have not been able to be present during the hearing this morning because I have been busy in an appropriation sub-committee, but I am sure that what has been said has undoubtedly expressed my views better than I could myself. Appreciating that, I shall only take a moment of your time.

My district is so earnestly and vitally interested in this subject that I did not think they would pardon me if I did not at least express my interest in it. My own district is bordered by the Connecticut River from north to south, and consequently our industrial life is very largely dependent upon the flow of that stream; the innumerable mill wheels and the navigation to the sea, which we anticipate will reduce our freight rates, both, of course, depend upon the flow of that river, and it is equally obvious that the flow of that river depends upon the forests, in large measure, of the White Mountains. Consequently there is a very great, and general, and deep interest, a deep financial interest by the manufacturers of the district, and a general interest throughout the district in this project, and I simply wish to express that, and to say that we hope that this committee will find that without an unreasonable expense to the Government this project, which will so greatly insure our future industrial life and prosperity, can be accomplished.

Mr. WEEKS. You are a member of the Committee on Appropriations of the House of Representatives?

Mr. GILLETT. Yes.

Mr. WEEKS. From your knowledge of the revenues and expenditures of the Government, do you think we are warranted in making an appropriation for this purpose this year?

Mr. GILLETT. You would not expect that one appropriation committee is going to define the limits of another?

Mr. WEEKS. It sometimes does.

(Thereupon, at 12 o'clock m., the committee adjourned until 2 o'clock p. m.)

AFTERNOON SESSION.

The committee met, pursuant to the taking of recess, at 2 o'clock p. m., Hon. Charles F. Scott (chairman) in the chair.

STATEMENT OF EDWIN A. START, SECRETARY OF THE MASSACHUSETTS FORESTRY ASSOCIATION.

Mr. START. I represent the Massachusetts Forestry Association, and am also one of the delegates from Massachusetts appointed by the governor. I have been asked, Mr. Chairman, to answer a question that was asked this morning two or three times, and I will try to do it very briefly; that is, in regard to what the States are doing. Now, I shall not attempt to speak for any except the New England States, but we have something to say on that point. Every State in New England has entered upon a State forest policy. The State of Maine has a forest commissioner. It has one of the best fire laws in the United States, which is being well executed, and which is saving a great deal of forest property in Maine. The State of New Hampshire has had for many years a forestry commissioner. It has a fire law which is not so efficient as the Maine law, but it is doing something. The State of Vermont has a commissioner, I think it is, of forestry, and although the State policy there is in its inception, they are beginning to do some work in the way of proper handling of their standing forests and reforestation. The State of Connecticut has a State forester, and a very excellent State fire law. It has already begun to establish State forests, and has two or three considerable tracts which are handled by the State as the national forests are handled by the nation.

The CHAIRMAN. Those forests were acquired by purchase by the State?

Mr. START. Those forests were acquired by purchase by the State of Connecticut. The State of Rhode Island, which, I am told, has a larger percentage of forest area than any other State in the Union, has now a forestry commissioner, and the forestry work there has, therefore, been largely educational, and they are trying to arouse an interest in the State in doing the work there that is necessary. For my own State, Massachusetts, I can say that we have had since 1904 a State forester. The State is spending now, in addition to the salary of the forester, \$10,000 a year, which is likely to be increased by the present legislature. Last year a number of laws were passed improving our forest legislation, one of them in the direction of strengthening our forest fire law, the other inaugurating a forest-warden system under the general direction of the State forester, and every year now for the past eight years something has been done by the Massachusetts legislature in the way of improvement of its tree and forest laws. I think it can be said that every State in New England is doing something at every session of its legislature in that direction. So that the States of New England are not coming here and asking the Government to do things that they are not willing to take a hand in themselves. They are moving just as fast as pos-

sible along the road that is under their own control, and we only ask for help in the work that we can not do.

The CHAIRMAN. Can you tell us to what extent the work which New England has been doing along the lines you have indicated has resulted in arresting the destruction of the forests and bringing about a better condition of affairs?

Mr. START. In Maine and in Connecticut, I can say, the fire laws have done a great deal. I can not give you figures, but the reports of the forest commissioner of Maine and of the State forester of Connecticut show a decided diminution in loss by fires under their fire laws. The Massachusetts laws have been so lately improved, so far as that phase of the question is concerned, that we can not say very much yet as to the results.

The CHAIRMAN. Do you know whether any of the States have attempted by legislation to regulate lumbering methods?

Mr. START. So far as I know, none have done so. I do not know that I should express an opinion on that point, but I should question whether they could, to any extent, except so far as fire is concerned, so that the general interest was threatened. I doubt if they could interfere very much with the use that a private owner makes of his own property.

Mr. HAWLEY. Under your New England fire laws, do you exercise supervision over fires built for the burning up of brush on private property?

Mr. START. Yes, sir.

Mr. HAWLEY. And do you require permission to be issued before they can burn brush on their property?

Mr. START. Yes, sir.

Mr. HAWLEY. To what extent are those fire laws in force along the region it is proposed that this White Mountain and Appalachian reservation should include?

Mr. START. Very little. It would be almost impossible to enforce such laws.

Mr. HAWLEY. You do not know whether the State would agree, in case this forestry proposition was entered upon, to protect the forests outside of the borders from fire originating outside and likely to spread inside?

Mr. START. No; I can not say what any of the States would agree to.

Mr. HAWLEY. That is not general in New England?

Mr. START. There is no agreement between the States.

Mr. HAWLEY. I mean, in the practice of your present fire laws, would that be the effect of it?

Mr. START. Yes, it would. Our fire laws are not what they ought to be yet, but they are moving in that direction steadily.

Mr. WEEKS. Have you any knowledge of the appropriation that has been made by the New England States for these purposes which you have outlined, the annual appropriation?

Mr. START. No, I have not, outside of Massachusetts.

Mr. WEEKS. Could you furnish that to the committee?

Mr. START. I will be glad to if the committee would like to have it.

Mr. WEEKS. Has any other State than Connecticut taken any steps whatever to purchase land for reforestation?

Mr. START. Not to my knowledge.

Mr. WEEKS. Are you familiar with the bill that is now pending in the Massachusetts legislature providing for the purchase of certain lands?

Mr. START. Yes.

Mr. WEEKS. That is for that purpose, is it?

Mr. START. Yes. That has not got very far yet, but has simply been introduced in the legislature. It is for that purpose.

Governor SMITH. I have been requested, Mr. Chairman, to state, after conference with several of the representatives from different States along the Appalachian reservation, that action similar to that in New England, to a more or less extent, has been, and is being, taken up. I do not know of any State which has a reservation, however. There are forestry chairs at their colleges and forestry commissioners in connection with their agricultural departments, and I am sure there is a readiness in all of the States to cooperate and do their part in support of a movement by the Government in that direction. I am asked, also, by Mr. Pinchot, who is not here this afternoon, to explain one statement which he made, which he fears might be misunderstood. It was his statement that 80 per cent of the trees had been cut. He meant by that that upon 80 per cent, probably, of the land in the Appalachian Mountains, the main trees had been cut, but he did not mean that 80 per cent of the land had been denuded. So that, still taken hold of, it could be made an efficient source of water reserve.

Mr. LEVER. Governor, if you will permit me, I suggest that Mr. Hall give some information as to the percentage of cut-over land on the watersheds themselves.

Governor SMITH. I will call him a little later for that purpose. I wish to ask Mr. Waddell to come forward and give his personal experience with reference to two streams, especially, where one had a watershed and the other did not.

STATEMENT OF MR. CHARLES E. WADDELL, OF NORTH CAROLINA.

Mr. WADDELL. Mr. Chairman, I am the representative of the American Institute of Electrical Engineers and the Asheville Board of Trade, and also a member of the forest committee of the American Institute of Electrical Engineers.

For the past four years we have been examining the streams, or in my office we have examined the streams, of the southern Appalachians, to determine, if possible, what effect the deforestation had upon the minimum flow. In any hydro-electric installation the factors governing as to the value of the power are the minimum flow and the maximum flow and the average flow. Of course, with the maximum flow, as Mr. Law pointed out this morning, the dams have to be designed very strongly, and it might be almost said that the minimum flow determines the ability of a given power to pay expenses and to pay its fixed charges, and, therefore, the minimum flow of a stream is of vital importance to any power consumer.

We have, at Asheville, the French Broad developed. The French Broad flows from the forests, takes its rise in the forests, of the Biltmore estate, a tract of 130,000 acres, most of which is virgin timber, and the French Broad possesses a more uniform flow than any other

stream in the southern Appalachians with which I am acquainted. The deficit at the Asheville plant is but 15 per cent per annum of the normal power that can be gotten out of the river. That is, if we take some auxiliary power in the form of steam or other power to supply 15 per cent, we can sell the entire average output on that river as prime power, the factor upon which Mr. Law based his 60 per cent this morning. The question came up as to the flow of a stream that had been deforested, in comparison with one that had the timber still standing on it. There is a little creek to the north of Asheville known as Beaver Dam, draining 14 miles of territory and emptying in the developed water power a few hundred yards above the dam. The area drained is practically bare of forest; it is exclusively agricultural. There is another little stream rising also in the high mountains to the northwest of Buncombe and Yancy counties, known as Toms Creek, a tributary of the Catawba. This little tributary we watched very closely, because it was at the developed water-power site. There is a little stream in McDowell County which flows from a virgin tract of timber. We estimated the minimum flow of that stream to be one-half of one cubic foot a second for every square mile drained. There are 14 square miles.

Therefore, the minimum flow was 7 cubic feet per second, and in the three or four years that plant has been in operation—it is a small, high head plant—we have had no reason to consider our estimate as erroneous. It has turned out to be practically correct. The little Beaver Dam Creek practically dries up by October. When we built this plant at Asheville we had the cross section of the pond very carefully made. One year after the pond was finished Beaver Dam Creek had brought down so much sediment that I thought it worth the expense to send a man down, and had the delta that had formed actually cross-sectioned with the transit, and we found, then, at the mouth of that creek that in an area of 14 square miles 12,000 cubic yards of sediment had been brought down in one year. If it continues it will, of course, fill up this pond, and the future of all those southern powers, their values, will be largely curtailed by the filling of their ponds. I think, for a small area, Beaver Dam Creek is a fair example of what we may expect from this.

The question as to whether a State can protect those forests has also been raised. We have looked into that very carefully there at Biltmore, and the State of North Carolina has looked into it. I doubt very much if the States can take action, or are in a position to take action, that would protect the forests. The largest streams flowing from the western part of North Carolina are the Savannah River and the Tennessee River. Their headwaters arise in the State, and the streams immediately pass out of the State. The streams, after leaving the State, are so entirely disassociated with the State that they even change their names. We have these rivers coming from this part of the country [indicating], the Catawba becoming the Wateree soon after it crosses, and the Yadkin becoming the Pedee. They so completely lose their identity that they even change their names. I think that if the value of these forests is to be maintained the future will see those slopes kept in trees, and that we will have to build, in the higher mountains, artificial lakes to conserve the flow of the streams. In the Southern Appalachians the glacial deposits and the shales that are so prevalent in the western part of New York State

and Pennsylvania are entirely lacking. The lakes of New England are entirely lacking; so that we have nothing but the forests to depend on to conserve those rivers, and we must construct artificial reservoirs if we expect to hold the flood waters.

The CHAIRMAN. Would you regard the construction of artificial reservoirs, then, as a part of this general Appalachian forest scheme?

Mr. WADDELL. That I am not prepared to say. I think, in many instances, the power companies will construct reservoirs. Just in this part of the country is the heaviest rainfall on the North American Continent, except the Puget Sound district. The rainfall in this section approximates 70 inches per annum. In the Sapphire country, as it is called, Toxaway Lake has been built. Users on the Savannah River report a much steadier flow since that lake was constructed, and the country at present is in virgin timber. Now, if that virgin timber is cut out, that lake will fill up and there will be comparatively no flow. The timber, I should say, is the prime consideration; the reservoirs are the secondary consideration. I believe the water companies will gladly construct reservoirs—will find it a policy that will pay them. The preservation of the timber is totally out of their field.

Governor SMITH. Without the preservation of the timber what would be the value of the constructing of reservoirs?

Mr. WADDELL. That was the point I was trying to make. I think that it would be useless. Toxaway Lake is a fair example. It is sparkling and clear; it is as clear as any New England lake, and there has never been a stick of timber cut upon it, further than what was necessary to construct the hotel. If that timber is cut, I am convinced that the lake will very shortly fill up.

The CHAIRMAN. The point I desired to bring out was as to whether it would be necessary for the Government to construct reservoirs as an essential part of this general scheme.

Mr. WADDELL. I do not know; I am not in a position to express an authoritative opinion on that, but I should hardly think so, although that has been done, I understand, in southern France, on the tributaries of the Rhone.

**STATEMENT OF C. J. H. WOODBURY, SECRETARY OF THE
NATIONAL ASSOCIATION OF COTTON MANUFACTURERS, OF
BOSTON, MASS.**

Mr. WOODBURY. In addition to the brief statement I made this morning relative to this association, I will say that it numbers a thousand members all over the cotton manufacturing districts of this country, and they have been thoroughly alarmed at the impairment of the water supplies of this country, so that the resolutions which were filed with you this morning were adopted.

The cotton manufacturers in New England have, from time to time, as opportunity afforded, exerted all of their interest toward these forest-preservation laws, which have been summarized by Mr. Start before. They authorized me to come here, and the governor of Massachusetts also gave me permission to represent the Commonwealth. They have sent down four men, four large manufacturers, of whom Mr. Dumaine appeared before you this morning—he has

under his charge very nearly twice as many spindles as any man in the world—and two other gentlemen, Hon. Arthur Low, of Pittsburg, who has mills at Pittsburg, at Clinton in Massachusetts, and at Huntsville, Ga., who was obliged to go back, as was also Mr. Joseph B. Gray, hydrographic expert of the Locks and Canal Company. Mr. Dumaine will be able to give you a word on the increase of the flow resulting from the decrease of forests. He is still here. These mills are large users of water. Nothing but the water power has been alluded to, but they use a great deal of water for bleaching and dyeing—as well as for the water supply which they put into conduits—for the very large number of operatives, so that it will not be possible to use wells with any regard to health.

Now, the value of a water power is less than that of its minimum flow, because when the power is very intermittent, it is necessary to put in some kind of an auxiliary plant, which is idle for a great part of the year, and that requires another expenditure. The transmission of power by electricity is also added to the value of the water power. I expected to have with us—but illness prevented—one of our manufacturers on the Connecticut River, whose opinion is that the minimum flow of the Connecticut for power purposes has decreased about 20 per cent in the last fifteen years.

Governor SMITH. That is in consequence of cutting the timber?

Mr. WOODBURY. That is the consequence of cutting the timber. I have nothing more to offer, in view of the very full testimony that has been given, except to put, perhaps, as a matter of record, that this practical work of forest preservation probably originated in my home town of Lynn, Mass., where the city has a tract of 2,200 acres, which is a forest tract, bought by subscription of citizens, and the deed was recorded on December 6, 1881. I believe that is the first instance where forest preservation has gone beyond talk. On the other hand, right by Lynn is the projecting part of a forest which was, in the time of John Smith, wooded. It was given up to settlers on condition that they should cut it off in six years. It became so sterile that it was abandoned except to squatters for pasture. That was later forested by Frederick Downs and is now a fertile district, a taxpayer's paradise, which was referred to by one Boston man as "Cold-roast Boston." But the cotton manufacturers believe that, in the strictest, most practical manner, this is one of the most important measures for the industries of this country, of which they are an important part.

**STATEMENT OF E. J. WATSON, COMMISSIONER OF AGRICULTURE,
COMMERCE AND IMMIGRATION, OF SOUTH CAROLINA.**

Mr. WATSON. I had the honor of appearing before you in regard to this matter last year, and covered a good many of the essential points at that time. On this occasion I come here more particularly to call your attention to the plain commercial proposition involved in this matter. My position in my State is commissioner of agriculture, commerce, and immigration, charged with all of those correlative branches of the work, manufacturing, agriculture, navigation, and everything of that kind falling under my direct control. The State that I represent, by the way, in this particular matter, is

so typical of the actual damage done by deforestation, that it gives you the most pronounced example that you can find anywhere in the Appalachians of serious damage, both to manufacturing property, to agriculture, and even to life. We are so situated that it is absolutely impossible for the State of South Carolina to protect herself if she had the means to do it. Practically 14,500 square miles of the drainage area that feeds all of those rivers flowing across the State of South Carolina, which is the seat of manufacturing in the South now, the Piedmont section, is beyond the borders of our State and we would have absolutely no control over it. We have in there practically \$103,000,000 invested in cotton manufacturing plants, \$18,000,000 of which are directly endangered every day and every hour by this flood situation. That does not take into account the water powers and the dams that are continually being filled up and, from time to time, ruined.

The same thing is practically true of our agriculture. Our agriculture in the Piedmont is seriously affected by the washing of gullies and the ruining of lowlands by silt and material that comes down very plentifully from the mountain area, and that practically within reach of the seats of navigation below there, on a general gradation from about 300 feet on to the sea; that is where navigation begins, where we are attempting to and are operating river steamship lines connected with the eastern ports for the transportation of manufactured and agricultural products. That situation, therefore, resolves itself into one in which are intertangled, you might say, the problems of agriculture, the problems of navigation, the problems of protecting manufacturing property, and almost every other interest in the State. We feel that that damage, which now amounts to, in agriculture, very nearly \$3,000,000 annually, on account of the overflowing and the rendering absolutely useless the bottom lands of the State, as one feature, and then the damage which has in one month amounted to a total loss of over \$3,800,000 to manufacturing property—we think those are things which command attention. We feel that if the United States Government can undertake to make arid lands valuable, that it certainly can prevent lands from becoming arid. We feel that it is a better and wiser policy—although I am not here to discuss policy, but this is merely a thought—that it is better policy for the Government to get at the seat of the trouble in the matter of rendering the streams navigable and remove the source of the trouble than it is for it, every year, to be spending continually appropriations to clean out the silt that comes down from the mountain. Now, gentlemen, I have borrowed some of these pictures showing milling property during the year 1903, and I would like to show them to you before I say anything further. That was the particular loss where over \$3,800,000 went by the board that year, and probably 50 per cent of that was northern capital invested in those mills.

THE CHAIRMAN. Were floods similar to the one that caused this destruction never known before the mountains began to be deforested?

MR. WATSON. No, sir. In South Carolina we had, perhaps, one flood of a description to amount to anything prior to that time, the flood of 1886 or 1887, and in that year the flooding of the rivers was due absolutely and entirely to a general rainfall, a continual, general rainfall on ground that had already been thoroughly saturated.

The CHAIRMAN. It has occurred to me that such a condition as that might happen nearly every year, and with results that would not be due to the deforestation.

Mr. WATSON. If the chairman will recall, he asked me that question last year, but I was not quite ready for him then. However, I think I am in a position now to show you that even with more excessive rainfalls than the Pacolet flood year we had no destruction resulting. I mean at the stations in the seat of the war. Take the year 1900 at Walhalla, a little point in northwestern South Carolina, one of the principal danger points. We had a rainfall there of over 15 inches during the month of June, while in the Pacolet flood year it was somewhere about 9 inches. But I have these figures for the month of June, the flood month, for a period from 1887 to 1907, which I would like to file with the committee for its information.

(The table referred to is here printed in the record in full, as follows:)

U. S. DEPARTMENT OF AGRICULTURE,
CLIMATOLOGICAL SERVICE OF THE WEATHER BUREAU,
SOUTH CAROLINA SECTION,
Columbia, January 25, 1908.

The following table gives the total rainfall for June for a series of years. All these stations are located in the central and western parts of South Carolina:

| Year. | Columbia. | Greenville. | Liberty. | Newberry. | Santuc. | Spartan-burg. | Walhalla. |
|-------|-----------|-------------|----------|-----------|---------|---------------|-----------|
| 1887 | 3.97 | | | | | | |
| 1888 | 2.18 | | | | | | |
| 1889 | 4.02 | | | | | | |
| 1890 | 1.13 | | | | | 2.26 | 3.37 |
| 1891 | 4.65 | | | | | | 4.54 |
| 1892 | 3.09 | 9.27 | | | | | |
| 1893 | 8.53 | 6.66 | | 5.30 | | 8.24 | |
| 1894 | 2.89 | 3.98 | 2.88 | 3.25 | 6.13 | 1.16 | |
| 1895 | 3.59 | 3.07 | 2.36 | 2.36 | 2.20 | 2.20 | |
| 1896 | 3.25 | 4.56 | | 4.18 | 3.56 | 3.18 | |
| 1897 | 4.48 | 3.63 | | 3.80 | 4.77 | 6.19 | 3.01 |
| 1898 | 3.02 | 2.18 | 1.58 | 3.69 | 2.16 | 3.83 | 1.85 |
| 1899 | 2.56 | 2.31 | 1.96 | 2.82 | 1.38 | 1.87 | 2.80 |
| 1900 | 6.80 | 9.75 | 12.88 | 3.09 | 6.65 | 7.94 | 15.19 |
| 1901 | 4.94 | 7.99 | 8.26 | 4.21 | 4.16 | 6.56 | 3.68 |
| 1902 | 4.43 | 5.34 | 3.01 | 5.47 | 3.61 | 6.43 | 2.47 |
| 1903 | 9.97 | 9.06 | 4.93 | 9.12 | 6.97 | 9.96 | |
| 1904 | 3.06 | 3.59 | 4.27 | 1.47 | 2.72 | 4.78 | 4.71 |
| 1905 | 0.86 | 1.95 | 2.55 | 0.35 | 0.63 | 1.01 | 6.80 |
| 1906 | 8.66 | 4.28 | 5.49 | 6.43 | 6.21 | 4.91 | 7.99 |
| 1907 | 2.63 | 6.80 | 4.20 | 2.60 | 4.28 | 8.28 | 4.55 |

J. W. BAUER, *Section Director.*

Some one asked the question this morning—and just in passing I would like to call attention to it—about how much would probably be necessary to maintain this work, and in looking over this bill I happened to run across section 9, to which I would like to direct your attention. That provides for the results of the sales of timber, the money resulting to be turned over to each State to be disposed of by the legislatures for the betterment of existing conditions. I would like to call attention to that section. I would like particularly to call the committee's attention to the fact that my State, the State of South Carolina, would get less money resulting from the operation of this bill than any other State connected with the Appalachian proposition. In other words, there would be only about 1,000,000 acres involved in South Carolina.

Now, gentlemen, in the loss to dams by the silt, I will say for your information—I do not want to burden you with figures, but some one asked the question this morning—I would like to call your attention to the fact that in the Piedmont we have practically discovered that our dams are affected by silt for about 20 per cent, loss of actual value, in a period of ten years. That is the general statement made up by most of the owners of the dam properties.

There are any number of facts and figures, and I would like to ask leave, through the member of this committee from my State, to file with the committee some extracts from newspapers, from time to time, giving the immense losses to agricultural property resulting directly from the deforestation. In one year we lost over \$1,000,000 in a distance of only about 8 miles below Columbia, which is below the Piedmont line, as a result of this flooding.

There is about 1 per cent of the land immediately below Columbia that is subject all the time to flooding. In the lower portion of the State, on the river courses, where agriculture is even more valuable, there is about 3 per cent of the area that is subject to overflow. I could relate to you many instances of my own personal knowledge where men have had to go in a boat over 3 miles to get to the center of their plantation and try to rescue what they could of their property. I could give you a great many facts in regard to the losses of cattle on the river courses and the losses of houses and other property, but I would like to ask leave, in view of the small amount of time here, to put such matters that I might feel would be of value and interest to you in written form and have them included in the record.

Mr. POLLARD. I would like to inquire whether these conditions were ever found dangerous before the commencement of extensive timber cutting?

Mr. WATSON. No, sir; it seems to be almost entirely in my own knowledge and close observation, because I live at the foot of this river course. The only instance we have ever had of any serious trouble began just about the year I mentioned, in 1887, when the actual buying up of the forest and the cutting down of huge quantities of timber began. I will furnish you, however, with the exact data, and I filed a book with the chairman here that gives you the exact data in that entire territory as to the amount of wood cut out, the amount that is annually restored naturally, the amount used for cross-ties, and practically every feature of it there. I also have filed with you a complete statement there even of the small tributary streams, of their fall and flow of water, and the general effect of the whole thing.

Mr. POLLARD. Do you know how the amount of rainfall compares now, or within the last three or four years, with what it was twenty years ago?

Mr. WATSON. That statement gives you that thing for the entire period. I do not include, however, the dry-season months.

Mr. POLLARD. This table, I see at a glance, shows the rainfall for only one month.

Mr. WATSON. That is the rainy month.

Mr. POLLARD. That is the only month in which you have rainfall?

Mr. WATSON. That is the only month in which we have this serious difficulty. I used that simply as an illustration.

Mr. HAWLEY. From what portion of the mountains has this timber been cut, from the low ridges or from the watershed?

Mr. WATSON. Oh, from the watershed.

Mr. HAWLEY. To what extent has the watershed been denuded of forest?

Mr. WATSON. The annual drain up there right now from the State of South Carolina's side of this proposition, on 600 square miles, is about 1,700,000,000 feet of lumber, and the cord wood is a higher percentage; that is, for firewood. That is $2\frac{1}{2}$ cords per capita.

Mr. HAWLEY. To what extent do you think the backbone or watershed is denuded of its forest?

Mr. WATSON. One-fourth of that mountain area, which includes the North Carolina side, too, is cleared, and 5 per cent has been actually ruined. In other words, gentlemen, there is going on up in those mountains exactly what has happened in China, with which all of you are familiar.

Mr. HAUGEN. Did I understand you to say that this bill provides that the Government shall purchase this timber land?

The CHAIRMAN. I think I can make that clear. You remember that in the Forest Service we provided that 10 per cent of the sales, or of the proceeds from the use of the National Forests, should go to the State to make up for the loss of taxes that they might suffer, and this is simply keeping in this bill the same provision.

Mr. HAUGEN. This bill provides that all the cost of the selling of timber will be turned over?

The CHAIRMAN. No, 10 per cent.

Mr. WATSON. In connection with that I will say that there is pending in the legislature of my State now, and I would like to file that as a part of the record, a provision for the appointment of a commission to make a thorough forest survey in the State of South Carolina and that that will probably be under my own direction, under the department of which I have charge, and we are to recommend to the general assembly such action at the next session as we deem necessary to cure all this evil, so far as the State itself can do it.

Mr. HASKINS. If I remember right, the Federal statutes require that where the Government takes over any lands by purchase or condemnation the States, through their legislatures, shall cede jurisdiction to the United States, with the exception of right of serving legal processes.

Mr. WATSON. My State two years ago passed an act giving the right of eminent domain for this purpose.

Mr. COOK. I would like to ask the gentleman a question. You made reference to what the Government was doing in the reclamation of arid lands. The people of your State, as well as the Southern States and the New England States, are living entirely under a misapprehension as to what our Government has done in that direction. Speaking for my State, Colorado, nothing as yet has been done toward the reclamation of our arid lands. It is true, however, that the Government is now constructing a tunnel from the Gunnison River, in the extreme western part of Colorado, to bring water to irrigate approximately about 80,000 acres of land, of which the owners are under contract to pay to the Government so much per acre for the water used for irrigation. That is simply a loan to our people

which will be repaid in a very short time. Therefore, I want to disabuse your mind of the fact that the Government in my State has spent nothing except for surveys for the reclamation of arid lands with the exception of this one project.

Mr. WATSON. I did not mean to criticise that in any way at all, sir, or anything of that description, because I want to see that work go on.

Mr. COOK. But it does not necessarily follow that we are opposed to your scheme at all. I simply wanted you to understand the situation in my State, Colorado.

Mr. WATSON. The only point that I wanted to convey was the fact, that if the Government can make arid lands valuable it can certainly keep land from becoming arid. [Applause.]

**STATEMENT OF MR. MORRIS KNOWLES, ENGINEER IN CHARGE
OF FILTRATION WORKS, PITTSBURG, PA.**

Mr. KNOWLES. I have the honor to represent the Chamber of Commerce of the city of Pittsburg. Governor Smith has told you of the resolutions which were presented and passed for the purpose of asking to have included the upper portions of the watershed of the Monongahela River. It is not a particularly personal and private gain for the city alone, or for the State. You will recognize that much of this watershed included within these limits is really without the limits of the State of Pennsylvania. As to the valuable interests affected in Pittsburg and in the district, the statistics have been quoted so many times that I will not bother you with them, but I wish to speak particularly as to the effect that floods have upon our various interests. The floods, of course, affect us in many ways; and, just in passing, I would say that not only do we have floods, but of course as an accompaniment of the floods we have a less total flow available, and we have a lower dry-weather flow. The floods affect vast property interests in the city itself. They affect the wage-earners, they affect the farmers, the transportation interests, the railways, and the river interests. It may not be thought that they affect the river interests, but they do, because unless advantage can be taken of going out on the beginning or the end of a rise there are considerable cargoes tied up because they can not go out on the highest water. Then I will just mention that these floods do affect the healthful conditions of the streams. In the railway interest it affects us because most of the railways are in the valleys, and they are flooded many times.

The navigation interests I have touched upon. The manufacturing interests are affected, not only the manufacturing concerns through losses and damage in the mill yards, because many of them are flooded many feet deep, but the wage-earners also.

In addition to all this, there is the fact that silt is brought down by the streams, and this silt and eroded material fills up the pools and basins and there is continual dredging out to make way for traffic. It fills some places that it ought not to fill and at the same time it erodes many lands and destroys manufacturing sites and other possibilities. In connection with that we have most of us heard of the American system of filtration, which has received quite an impetus in this country. Why is that? Complicated questions are

brought about in taking care of our water supplies which would not arise if we did not have these conditions. The last flood in Pittsburg, of March, 1907, was a very serious one, one of the most serious that has occurred in a century, and really put the city in a very precarious condition. The street railways were affected so that they could not run. The lighting and power plants were affected so that they did not furnish lights for the streets, and it came very near indeed to depriving us of our water supply because of the approach of the flood to the boilers of the plant. We see that in material ways the floods affect us, and they affect us seriously. Any means taken to hold back the storm or flood flows would conserve the water and would remove this danger. It has been quoted from the Weather Bureau investigations that the recent cost in Pittsburg was something like \$10,000,000. We see, then, that the problem is right with us; it never will cost less than it does at the present time, and the time is ripe to make a start.

The CHAIRMAN. Will the watersheds of the rivers which flood Pittsburg be protected by the preservation of the timber of the Appalachian system?

Mr. KNOWLES. The present area is in the Monongahela watershed entirely. That, of course, is one of the great rivers which join the Ohio at Pittsburg, and it is one of the great rivers which does cause floods; so that that, you might say, is a portion.

The CHAIRMAN. How about the Allegheny?

Mr. KNOWLES. The Allegheny is not included.

The CHAIRMAN. Is it not proposed to include it eventually?

Mr. KNOWLES. I personally myself feel that there should be a start made.

The CHAIRMAN. And you would come in next year for the protection of the Allegheny?

Mr. KNOWLES. It seems to me, if there is no start made, nothing is going to be accomplished.

The CHAIRMAN. Is it not true that there have been very great annual damaging floods in Pittsburg ever since the city was founded?

Mr. KNOWLES. It is true that there have been many floods. I doubt if any control of man can do away with all floods. I think it will simply act as a measure of control of the rivers. I did glance over some statistics, but I will simply say that I have here a table which I would like to present. Pittsburg calls a stage of 22 feet flood stage. This table shows us the number of stages above 22 feet since 1810. From 1832 to 1852 there were eight times when it was above 22 feet. From 1852 to 1872 there were ten times, and from 1872 to 1892 there were twenty-two times, while from 1892 until the present time, which only includes fifteen years out of the twenty, there were twenty-three times when it was above 22 feet. That shows that the floods are more frequent than they used to be.

Mr. STANLEY. Are they correspondingly destructive?

Mr. KNOWLES. They are more destructive. The valleys are more thickly populated and there are more railways and manufacturing concerns in the valleys. Outside of that I can not state as to whether they are more destructive or not.

Mr. STANLEY. Is it not true that the waters rise much more rapidly now than they did formerly, and that the rapidity of the rise makes a rise of a given stage much more destructive than it was formerly?

Mr. KNOWLES. I have no information on that, but it is my opinion, as a hydraulic engineer, that we have very much quicker run-offs from the watersheds.

Mr. STANLEY. And the velocity of the river is proportionately greater as the rise is quicker, is it not?

Mr. KNOWLES. That is true.

Governor SMITH. We will call Mr. Leighton next. Will you please state your business first, Mr. Leighton, and how long you have been so engaged, fully?

**STATEMENT OF MR. M. O. LEIGHTON, CHIEF HYDROGRAPHER,
UNITED STATES GEOLOGICAL SURVEY.**

Mr. LEIGHTON. Mr. Chairman, I am in charge of the water resources investigations of the United States Geological Survey. My official title is chief hydrographer. These investigations cover the entire United States and are directed more specifically to determining the amount of water afforded by the various streams of the country and its application to specific water problems such as navigation, irrigation, water supply, flood prevention, and so forth.

I am also acting in an advisory capacity along the same lines to the Inland Waterways Commission. Governor Smith has asked me to give you briefly some of the results of an examination made during the past summer with reference to the effect of deforestation in the southern Appalachian Mountains on navigation in those coastal streams and Ohio River tributaries which have their sources in these mountains. I was expecting to have a direct and cross examination, rather than to present a particular discussion, and therefore I think I will save your time if I give you a few extracts, very brief extracts and concise ones, from a preliminary report that has been prepared on this matter.

Up to June 30, 1905, the United States had expended nearly \$30,000,000 to improve navigation on this coastal plain and on the Ohio River tributaries. The completion of those projects as they are now planned by the Engineer Corps will involve the expenditure of \$56,000,000.

The CHAIRMAN. In addition?

Mr. LEIGHTON. That is the total, Mr. Chairman. On all these rivers, as you know, there are seasons during which navigation is possible. There are other seasons when navigation is impossible. The trouble is that the water is not distributed evenly over the entire year. If there were such an even distribution, there is no doubt that during the entire year these rivers would be navigable, at least in their lower portions, with plenty of water under the keel. But as has already been explained, we have too much water at one time and not enough at another time. So for the past generation or so the United States has been endeavoring to correct that condition and provide for inland water navigation during all seasons of the year, and so far the practice that has been followed is what we might call adjustment of channels; that is, river channels have been excavated, locks and dams have been constructed to keep up the small amount of water that still persists during dry seasons, jetties and entraining walls have been constructed so that they might make the best possible use

out of the small bit of water that remains in these streams during low-water seasons. You will note that no endeavor has been made, except in one case, which I will present directly, to control the stream by controlling the sources of its water supply, and lower channels have been adjusted to take care of whatever water might come down and to preserve the remainder during the dry seasons by narrowing channels and deepening them. You will note also that, so far as it involves dredging, this problem involves dredging year after year until kingdom come; and it may be of interest to you to look over the reports of the Chief of Engineers and find out what has been expended for temporary dredging of the channels that should fill up at the next flood season, and consider going on year after year according to that process, and to see, if you worked it up into a sinking fund, what you might do with it by controlling a river by controlling its sources of water supply.

The United States has adopted this conservation method in one case, and that is at the head of the Mississippi. They have built several reservoirs there which are being operated every season with success. They have nowhere near developed the proposition as they could or as they probably will, but there is the one case in the United States in which this method of controlling streams for navigable purposes has been used; and I want to read you four or five lines from the Annual Report of the Chief of Engineers for the year 1906. Speaking of this system of reservoirs he says:

The incidental fees of the reservoir system, or such portion thereof as can be approximately calculated, have been estimated at \$500,000 annually. While the board understands that estimates of this kind can be considered only general approximations, it believes that they are definite enough to show conclusively that the original investment by the United States of \$1,500,000 is returning ample revenue.

When we approach this southern Appalachian proposition and that of the White Mountains and consider it from the inland waterways standpoint, we are approaching it in exactly the same way that the Army Engineer Corps has solved a great many of the navigation problems of the upper Mississippi. The difference is that in this case it is proposed to make your conservation reservoirs not artificial, unless you desire to do so, but natural; keep provision there for storing the water temporarily, lowering the floods, and raising the navigable stage during low-water seasons. It is a good deal better, for example, to add the depth you require to the top by reason of an extra supply of water than it is to year after year dig it out from the bottom with a dredge. That is the gist of the whole matter.

Now, to get down specifically to the results of some of these investigations that were carried on by the Bureau which I represent, in cooperation with the Forest Service, the Forest Service turning over to our Bureau all the investigations involved in that appropriation that Congress made last year; turning over to our Bureau, I should say, those problems involving water-supply considerations.

Consider, for example, the Roanoke River. Its use for navigation appears to fluctuate widely from year to year. Up to June, 1905, the United States had expended in the improvement of this river \$239,000, and it is evident that the work done has not been effectual in inducing shippers to make extensive use of this channel. Let me review for a moment the efforts that have been made, what they are trying to do

on this one river. The river is subject to sudden and frequent freshets, causing recorded rises at Weldon, N. C., of 50 feet. The maintenance of a 4-foot channel below Weldon during these dry seasons can hardly be accomplished with satisfaction without a greater supply of water. That is the project of the Army Engineer Corps; that is all that they hope to accomplish. When they have finished their project that will be a 4-foot channel. It should be remembered that a 4-foot channel will not, under modern conditions of traffic, permit the passage of boats sufficiently large to compete with railroad transportation. Small shipments are no longer profitable by the water route, and therefore a 4-foot channel in the Roanoke would hardly be attractive even if it were properly maintained.

Now, let us see what can be done along this portion of the Roanoke by the conservation of the waters. This involves the prevention of deforestation, which will conserve the waters and also prevent silt coming down and filling up the rivers. Right here I want to call the attention of the committee to that set of photographs of the southern Appalachian proposition. It gives several excellent examples of this washing down of silt into what should be navigable channels. Before I take that up specifically I want to revert to a question that the chairman asked of a former speaker, namely, Would the setting aside of this area make it necessary to construct storage reservoirs? Such construction is not necessitated, I would say, by the passage of this bill and the carrying out of these provisions, but having acquired the land, so that there will be no damages arising from reservoir construction, it is good business and it is a gilt-edged investment to build those reservoirs and thereby save money that would otherwise be put down in the lower portions of the river year after year with only temporary results. I think when you have summed up the whole situation and see the actual money value in it, you will agree that a private corporation, a business corporation, which failed to take advantage of such a gilt-edged investment, would be a fit subject for receivership.

Now, to return. In addition to the conservation that will be effected by reforestation or prevention of deforestation of this country we have the possibilities of reservoir sites. On some of these drainage areas we have good surveys; on others we have not, for reasons that are perfectly clear when we consider the appropriation bill every spring; but we have on the Roanoke River basin selected four reservoir sites of large capacity on which reservoirs can be built which will conserve the entire annual run-off from 1,250 square miles. That is, if those reservoirs were constructed and the gates closed, in an average year the reservoirs would not overflow for a year. That is, I think, something like 25 to 30 per cent of the whole drainage area. Considering the effect of these four storage reservoirs, what can be done in that lower navigable channel by holding back these waters during the flood seasons, thereby preventing the floods absolutely, and by letting them go when the water is needed in the lower valley? Well, we will take the station that has been maintained by the Survey at Nile, N. C. There would be water enough on an annual flow, on an annual catchment, in those reservoirs to provide at Nile and along that section an additional 6 feet of water, a 6-foot depth, for one hundred and twenty-two days; that is, about four months, which may be considered practically the maximum low-water period. It will

provide 6 feet for one hundred and twenty-two days or 5 extra feet for one hundred and ninety-seven days. We will follow it down on some of the other streams and I will just mention in those cases the actual effects.

Take the Savannah River, for example, at Augusta. There are on that drainage area selected reservoir sites, about a dozen in number, which are of a capacity sufficient to hold the entire year's flow from 1,670 square miles of the Savannah drainage area. Considering now one hundred and twenty days—four months—as a fair low-water period, those reservoirs, if properly manipulated, will provide an extra 9-foot depth at Augusta for a period of one hundred and eighteen days, or an extra 8-foot depth for a period of one hundred and thirty-nine days. These depths are all based, you will understand, on previous work we have done in rating those channels and determining how much rise a given flow of water will make. It might be of interest here to show what they are trying to do under present methods on the Savannah River. The river as a whole presents one of the best cases in which it can be demonstrated that the conservation of water and its proper manipulation may be under certain conditions more effective than any other method. Here is a river in this particular part, from Savannah to Augusta, which during a greater part of the year is navigable for steamboats drawing 4 or 5 feet of water, but which during low-water season, due to shoals, will not afford a low-water depth of more than 3 feet. That is what they are trying to insure there—3 feet. The question is pertinent, What will they do with 3 feet after they get it? Here, after surveying the water, controlling the river at the sources of its supply, and figuring on this whole thing, I may say with the utmost conservatism we can insure in that section 8 feet for one hundred and thirty-nine days and 9 feet for one hundred and eighteen days.

The CHAIRMAN. Have you any estimates of the cost of these reservoirs?

Mr. LEIGHTON. No, sir; I have not. The time has been all too short to bring it down to that point. This reservoir discussion I have given you as an addition to the effects of reforestation and preservation of the forests.

I may say that the reservoirs will not be worth a minute's time or a cent of money unless the forests are retained. We have in the arid West, for example, very wholesome lessons with respect to the filling up of reservoirs on drainage areas that are bare. Take the great McMillan reservoir in New Mexico; it silted up some 60 per cent in fifteen years. That is an enormous lake. Probably there are few artificial reservoirs in the country at the present time of that size. In fifteen years, in spite of its great depth and great expanse, 60 per cent of its capacity was lost. So it will be here. If you want to go ahead and have the United States Government take advantage of this gilt-edged investment, which no private corporation would allow to go out of its grasp, it will be necessary to preserve the forests, and if you want to get the money back into the Treasury you can construct your reservoirs, save the money that you are now expending uselessly on the lower rivers, and—well, there is a question of water power that I will not go into. It is safe to say that by the construction of these reservoirs extra power is created, and it seems only equitable that there should be some small return, at least, on the power created by

the Government. It should have some return; but I will not discuss that, as it is out of my province.

Mr. POLLARD. How many reservoirs do you say would be required to control the Savannah River?

Mr. LEIGHTON. I will give it to you exactly. It is about a dozen.

Mr. POLLARD. Did you make any estimate as to the cost of those reservoirs?

Mr. LEIGHTON. I have had no opportunity to do so as yet. We have merely considered the actual facts and the capacity. I have made calculations of 100 or more reservoirs in the Ohio basin. By the way, I omitted to discuss the effect on the navigable portions of the Ohio. One hundred and four or 105 reservoirs could be constructed there which would actually control the floods and provide a 9-foot depth along a good part of the Ohio River; that is, this would be an alternate proposition, the one proposition being the lock and dam system and the other proposition being the partial lock and dam system and the reservoirs. But these 105 reservoirs there would cost about \$125,000,000. Now, that sounds big, but nothing can be considered costly that brings a good return on the money. This report will come out in connection with the report of the Inland Waterways Commission and will be available to all of you. This system would have absolutely prevented damage during the two great floods of March and January on the Ohio River last year. Those two floods cost the people of the Ohio Valley \$100,000,000. That is, we carried the estimate up that far and then stopped because we had enough. But that did not take into consideration the depreciation of property that is subject constantly to flood hazard, and that, after all, is the greatest item of damage in connection with floods. Of course you can see that it will prevent, and forever prevent, the development of that property in any way that is useful.

Mr. POLLARD. You speak of the construction of these reservoirs as being a gilt-edged investment on the part of the Government and a sure means of revenue. I would like to have you explain how the Government will get any revenue out of it?

Mr. LEIGHTON. In the first place, the Government would save the money it is now wasting on dredging.

Mr. HASKINS. On river and harbor work?

Mr. LEIGHTON. Yes. It would save the money it is now needlessly putting in for locks and dams. Inasmuch as you have introduced the matter of power, I would like to go into it a bit. I have here a list of the indicated horsepowers available; that is, the energy developed by these various rivers. We will take, for example, the Chattahoochee. The minimum indicated horsepower on that river, and that is based on the minimum flow, according to the measurements of my bureau as taken for the past seven years, is 145,000.

Mr. POLLARD. That is the low-water stage?

Mr. LEIGHTON. That is the low-water stage, the lowest waters observed in seven years. That is 145,000. That figure includes power that is developed as well as available for the Government. The Chattahoochee is not the best river down there to conserve with reservoirs, but if you could build reservoirs—and you could—and use all the reservoir capacity you have got, you could hold over for six months from the flood season to the low-water season—about six months we will say—and you could develop with that storage on that river

199,000 horsepower more, which would be due directly to Government expenditure on that drainage area. I contend that the Government ought to get a suitable return on that expenditure. Whether or not that is possible under the Constitution, I do not know. It would be good business at any rate. There would be 199,000 extra horsepower available on the Chattahoochee by reason of this reservoir system, while if you take the Tennessee from head to foot, you will get an increase in horsepower of 1,315,000.

Mr. POLLARD. Over what is at present available?

Mr. LEIGHTON. Over what is at present available. That is based on a storage period of six months—that is, six months' flood and six months' dry season, during which they would need that water. And, mind you, the power necessities in this case are identical with the navigation necessities. The low-water season affects both at the same time.

Mr. POLLARD. Have you carried this investigation further to determine the cost of the construction of these reservoirs on this particular river in Tennessee?

Mr. LEIGHTON. No; we have not got to that yet. That is a very laborious piece of work. We hope to do it some day and get some approximate amount.

Mr. POLLARD. The reason I asked that was to get a comparative basis as to which would be the most economical to the Government. I supposed you had probably the amount of money that the Government has expended in improving the river.

Mr. LEIGHTON. I think I read that in the beginning.

Mr. POLLARD. On this particular river? Of course, if you have not the other figures it would not be material, because we could not get a comparative basis.

Mr. LEIGHTON. You are inquiring about the Chattahoochee?

Mr. POLLARD. About that or the Tennessee, either.

Mr. LEIGHTON. The Tennessee River is a much better illustration. The Tennessee River is one of the best rivers in the United States, and the effects of this proposed conservation on navigation in the Tennessee River are far more marked than on any of the other rivers I cited. The amount appropriated and allotted for the Tennessee River up to June, 1905, was \$7,170,000. The work is only in its infancy.

Mr. HASKINS. That is from what time?

Mr. LEIGHTON. Up to June, 1905. I have not the early day.

Mr. HAWLEY. I did not quite understand from your remarks whether you attributed the flooding in the Ohio River to the denudation of the forests?

Mr. LEIGHTON. A large part of it; certainly.

Mr. HAWLEY. We have records of very high floods in the Ohio as far back as the time of Gen. George Washington.

Mr. LEIGHTON. Yes; very good records.

Mr. HAWLEY. How do you compare the floodings at that time with the floodings now?

Mr. LEIGHTON. The floods in the Ohio, as shown by the long series of gaugings at Wheeling, when they are combined in a progressive way so that you can compare one year with another, show an increase; that is, more frequent floods and more persistent; that is, longer continued.

Mr. HAWLEY. You mean later and longer continued?

Mr. LEIGHTON. Later.

Mr. HAWLEY. How can that be, if the water runs off more freely from the denuded area?

Mr. LEIGHTON. That would be the very thing you would expect. During the later years, when the lands have been denuded, the floods would be higher.

Mr. HAWLEY. I can see how they would be higher.

Mr. LEIGHTON. I see your point. All the water, we will say, runs off now, and while, of course, it piles up higher, still there is the time component. You can not push through a channel more than a certain amount of water at a certain stage. In the former conditions we will assume that half of the water was taken into the ground and half ran off directly. That half that ran off created a high flood and at the same time it was of shorter duration because the water was not there to continue it. Now, we will assume that it all runs off, but it has got to go through the same channel, between the same banks, and therefore it can not get through so quickly, and therefore the flood will be higher and at the same time longer continued.

Mr. HAWLEY. The floods at the time of George Washington spread all over that country.

Mr. LEIGHTON. They do now.

Mr. HAWLEY. As they did when he went down on that famous march of his?

Mr. LEIGHTON. Crossing up to Terre Haute?

Mr. HAWLEY. Yes.

Mr. LEIGHTON. I have seen it in the same condition there, in the lower Wabash, that same lower Wabash and Little Wabash country. I saw it in the same condition there in 1902 when I was working there.

Governor SMITH. You have your full reports here. Can you leave that full report with the committee, or a copy of it?

Mr. LEIGHTON. I will be very glad to provide the committee with this report. I would like to keep it for a day or two, however, to make another copy of it.

The CHAIRMAN. Is it going to be printed as one of the reports of your Bureau?

Mr. LEIGHTON. I understand it is to be printed by the Forest Service in a series. It is a report on a part of the investigation for which you provided last year under an appropriation of \$25,000.

The CHAIRMAN. Then that will come to us in the form of another publication?

Mr. LEIGHTON. It will be eventually printed.

Mr. HAWLEY. Of all this Appalachian region there, colored in blue on the map, what portion of the watershed is denuded of its forest? I do not mean of the lower region, but of the upper region?

Mr. LEIGHTON. Denuded of its forest?

Mr. HAWLEY. Yes; how much of it has no forest stand?

Mr. LEIGHTON. I have not any idea. It is a new country, and we have not given attention to that particular part. Mr. Hall, of the Forest Service, can give you an idea of that.

Mr. POLLARD. You say you have been all over that territory?

Mr. LEIGHTON. I have been all over that territory.

Mr. POLLARD. What part of the watershed proper has the timber still remaining on it in its virgin state?

Mr. LEIGHTON. I would not be able to state. I simply remember that a large part of it has been cut off. That is on the backbone itself, not on the lower slopes. That is hardly so important as the other, but from passing through the country I simply remember that great areas of it have been cut.

Mr. HAUGEN. Did I understand you to say that the construction and maintenance of the reservoirs was less expensive than the dredging—more practical and less expensive?

Mr. LEIGHTON. Less expensive. The initial construction for reservoirs is undoubtedly more expensive than the other, and when you take up your maintenance charge and have it accumulate year after year you very rapidly have it equal to the amount that you initially put into the reservoirs. Reservoir maintenance is cheap. The construction cost is heavy, but not so heavy in the end if you own the land.

Mr. HAUGEN. I understand you to say that it is the most practical course to pursue?

Mr. LEIGHTON. Yes, sir. If there are no further questions, that is all, Mr. Chairman. [Applause.]

Governor SMITH. Mr. Chairman, the committee of course understands that Mr. Leighton is here all the time, and we will not take up any further time asking him any questions. He is always here at your disposal. Governor Floyd, of New Hampshire, must leave at 4 o'clock, and we will ask him to address you next. [Great applause.]

STATEMENT OF HON. CHARLES M. FLOYD, GOVERNOR OF THE STATE OF NEW HAMPSHIRE.

Governor FLOYD. Mr. Chairman and gentlemen of the committee, this subject has been pretty well talked over and thrashed out, and I think you have got about all in your heads that you want to take care of in one day, and I will be very brief.

This is a subject that New Hampshire is greatly interested in. We have 425,000 people living in New Hampshire, and probably 300,000 people are dependent for a living upon the water powers of New Hampshire. We have 600,000 acres of land that ought to be covered with spruce and hard-wood timber. There has been 80 per cent of this cut over, and we have lost 80 per cent. There is about 20 per cent, probably, of the virgin forest left. There is about 30 per cent of this that is cut off entirely bare, so that there is not anything that grows on it at all. There is about 50 per cent that is covered with hard wood and small spruce timber. Now, this which is covered with hard wood and small spruce timber is what we want you gentlemen to give us the money to buy and protect; and really our lives and our prosperity in New Hampshire are dependent upon this on account of our water power.

I do not know anything about the technical part of water powers, but what I know, I know from observation. I have been in the mountains a great deal. Last year on the 24th of June I was in the mountains, and I went out into a spruce forest, an evergreen forest, and I found a snowdrift there the 25th of June 15 feet deep. That was universal thirty years ago, before we cut off our forests;

our snow lay in the mountains along until near the 4th of July. Now the spruce timber is cut off, and there is no shade from the sun; of course the leaves of the hard woods do not come out until after the frost goes out of the ground, and consequently after the snow is gone. Now the snow all melts and rushes off, and we get freshets all along the line, and Mr. Dumaine told you that one freshet cost the Amoskeag corporation \$500,000. You can see that after the evergreen or spruce forest has been cut away if we get a warm rain in spring it melts all the snow in a bunch, and we get not only the rain, but the snow all melts at once and rushes down. If we can get an appropriation to buy about 50 per cent of this land which is covered with hard wood which has never been cut, that is what we want. Hard wood is coming into the market very rapidly. The price of all lumber is going up all the time. Our pine is nearly exhausted and our spruce is nearly exhausted. Next they will take the hard wood, and that will take all the timber that we have got, and we want to protect this young spruce; we want to protect these forests, 50 per cent hard wood and young spruce.

Now, you know how this cutting has gone up and up the hillsides. In the valleys where it was easy to get at, they have cut out all the spruce, but up on the hillsides it was left because it was not profitable to cut it. When spruce timber was selling in Boston for \$15 a thousand you could not haul logs a great way in the woods; but now it is \$22 and \$24, and that makes it pay to cut it and makes it valuable, and they are going up on the sides of the mountains and cutting out this spruce. This spruce land can be bought at a very low price. Some of you gentlemen may say that we do not know what we want ourselves, that we do not know what we want to buy. We have a proposition, and the proposition is this, that we can buy any of this land that has been cut over for from 50 cents to \$1 an acre. I know every man that owns this land, probably, and I could not go to one of those men and get an option on his land; that would be impossible. On land that I know I can buy for \$1 an acre he would want for an option \$5 an acre to-day; but he says "When you come with the appropriation, with the money, we will sell it to you at about your own price." That is the way it has got to be done.

Some other gentleman made a statement here that we had no fire wardens. The State of New Hampshire has fire wardens, paid by the State, and we are trying to protect our forests. We have fire wardens all over the State of New Hampshire, and are trying to protect the forests of the State. We are greatly dependent on this, and you gentlemen realize the great importance of it. I live in Manchester, a town of 42,000 inhabitants. They are all dependent on this water power. I have not the figures, but I can send them to you, which will show for twenty years how this power has gone down, and down, and down. You can see how it would be. This water all flows down in the spring; there are no woods up there to hold back the snow or stop the melting, or the flow of this water, and it all comes down in a rush. I am connected with an electric power company. We could sell the power for \$18 if we could sell it the year around, but there are about three months in the summer when, if it happens to be a dry summer, we have to burn coal, and we are 42 miles

from tide water, and it costs us \$1 a ton to bring that coal from tide water. If we could run by water power and depend upon the power the year around, we would be glad to supply it for \$18; but to-day we must charge \$35 because we do not know what we are up against. This is of great importance. I am not a public speaker, but I come here to tell the truth to you about our people, and I want you to believe us when we say that what people are there are there because we had the forests and our natural resources, and unless we can protect them we will have nothing; and they have gone beyond us. You may say we have been foolish, and perhaps we have. I was not, because I did not have anything to do with this; I was not there early enough. But let it go as it is; we are here to-day telling you the situation, and we have got to have something done in order to save us, and we come here to you in an honest and straightforward manner and tell you that our people at home are suffering and we want you to help them in this, and I am going to leave it to you to report this bill when you get to it, and report it favorably. I thank you. [Great applause.]

**STATEMENT OF MR. WILLIAM L. HALL, OF THE FOREST SERVICE,
DEPARTMENT OF AGRICULTURE.**

Mr. HALL. Speaking of the tributaries of the Ohio, which I mentioned, I want to refer especially to the Monongahela. This watershed was examined this past summer under the special appropriation Congress made, and we found that the Cheat River, one of the largest tributaries of the Monongahela, has still about 80 per cent in forest; that is, only 20 per cent is cleared. Farther west some of the western tributaries are more nearly cleared, and the extreme western tributary, the Southwest Fork, has now only about 20 per cent of its area in forest. That 20 per cent has practically all been cut over, but it has not been cleared for farming purposes.

Regarding the southern Appalachian region as a whole, which Mr. Pinchot referred to this morning, two years ago the Forest Service made an estimate of the timbered land by counting throughout that region, from Pennsylvania south, and it found that there was a timbered area of 58,000,000 acres and there was a cut-over area of 48,000,000, leaving 17 per cent of the Appalachian forest not cut. Of course the timber which had been cut has been cut only in part. The larger trees had been cut, leaving many of the smaller ones there. That is why the entire area was not cut to denudation. Simply the larger trees were cut. But 17 per cent of the Appalachian forest remained, and only about 60 per cent of the land remained in the forest at all, 40 per cent having been cleared for the whole region.

Mr. LEVER. Mr. Hall, have you any information as to the foresting of cut-over lands on the watersheds proper on the backbone of the mountains?

Mr. HALL. That area in blue on the map represents 23,000,000 acres. Ten per cent of that area has been cleared. About 50 per cent of it is cut over in a very good condition; about 50 per cent is still virgin timber.

**STATEMENT OF CHARLES C. GOODRICH, OF HARTFORD, CONN.,
GENERAL MANAGER OF THE HARTFORD AND NEW YORK
TRANSPORTATION COMPANY.**

Mr. GOODRICH. Two years ago I had occasion, by appointment of the governor, to come before this committee and say a few words in regard to the whole matter of the Appalachian and White Mountain forest reserves. This season I was again asked by the governor's executive secretary if I would come here. I wish to say but very little this year, and that to apply entirely to the effect of the cutting of the forests in the White Mountains upon the navigation in the Connecticut River. I would say that for thirty years I have been manager of some thirty-five United States vessels engaged in coastwise trade between the various ports upon the Connecticut River, and in this term I have had ample opportunity to realize the effect upon our river of the denuding of the forests in the White Mountains. I would say that especially of late years, and since the cutting has extended to the minor timber, the spruce of 6 or 8 and even 5 inches, which was formerly left to grow, is now being taken by the pulp mills. I have been in that vicinity for forty years, although only thirty years in this particular capacity, and from the beginning of my experience our floods have commenced about from the 1st to the 10th of April, and they came for the next two months pretty steadily, and for two months longer there was still a steady feed from those mountains. In the last twenty years the freshet has come fully one month earlier, the snows have started to melt fully one month earlier, the continuation has been more than one month longer, and the total supply of water has been reduced at least 50 per cent, coming rapidly in the spring, when it was of no use to the mill man or the man engaged in navigation, and escaping and going by without being made valuable in any way, and has been followed, at the present time, by an almost total lack of flow, beginning with about the 10th of May and extending through until the fall rains come again, nearly to the 1st of October.

In the lower river, speaking now of Hartford, and below that to the mouth of the river, there is about 1,000,000 tons of marine commerce, and with the aid of nature, so far as Long Island Sound is concerned, 15 miles away, and the aid of the Government to the extent of \$10,000 a year, devoted to the yearly removal of deposits that come from the north, the navigation has been steady and uninterrupted, and we have had that for quite a number of years. Not a trip has been lost by the daily steamers running from Hartford to New York; but, as I say, that has been made possible mainly by Government aid.

As to the effect upon the whole nation and its being more than a local question, I rather appear in the interests of navigation as a whole than as to any local matter. I would say that if at any time a cargo of lumber from Mobile or from Brunswick, Ga., or fertilizers from Georgia, or any cargo in the coastwise trade coming to that river, the very first thing you do is to call up and find out what depth of water you can actually get in the river. It will be from 3 to 5 feet, according to the varying degrees of water. We have from 15 to 30 or 40 feet in the spring, tapering off by May or June and until

these alluvial deposits have been cut, it can be reduced to $9\frac{1}{2}$ or 10 feet, and prices will go up correspondingly. In the last twenty years the bar at the mouth of the river, which now extends off to a distance of 3 miles offshore and into the 15-fathom line of water, and has extended to the seaward from 3 to 4 miles, to the same depth of water, has so confined the flow of the sound that the outer end of the bar has ceased to build, and it is adding constantly to the long sand shoal, now 10 miles to the west of the mouth and in mid sound.

Of course, gentlemen, I know that as long as rivers run these bars will build and they will go on building, as they will to a certain extent in the Connecticut River; with the wash of the unprotected mountains and the clearing away of these forests and the burning and denuding and washing, we are getting far more than our share of New Hampshire and Vermont and Massachusetts—more than we wish to have planted at that point, for it is certainly a source of very great danger and annoyance to us. [Applause.]

STATEMENT OF MR. L. C. GLENN, OF VANDERBILT UNIVERSITY.

MR. GLENN. Mr. Chairman and gentlemen of the committee, I have spent the larger part of the last four summers in the field, investigating the conditions in the southern Appalachians. I do not propose tiring you, though, with the laborious details of this work. Perhaps I should say before beginning that I was employed four years ago by Professor Holmes, State geologist of North Carolina, to conduct investigations in western North Carolina. We soon found that we had to go beyond the borders of North Carolina to cover the problem, and it became a serious matter as to whether he could expend North Carolina funds to conduct investigations in Tennessee and Alabama and Pennsylvania and West Virginia and other States. To relieve us of the worry the Hydrographic Division of the United States Geological Survey offered cooperation and began paying expenses, and still more recently the Forest Service has taken up the work and has finished it, so that the work I have done has been under the cooperation of those three bodies. It is especially a work in the study of erosion in its effects in that region itself, and in its effects in the region watered by the streams that head in those mountains and flow out radially, as you see in that map, like the spokes of a wheel.

There are two facts that are a key to the findings. The first one is that because of the geological history of the region there is, over the most of it, a thick blanket of disintegrated rock and soil formation, so that much of the region is massed, and there are very big, rugged cliffs projecting. The second of those facts is that we have down there the greatest precipitation to be found anywhere in the United States except in the Puget Sound region. We have, in some places, an annual rainfall of 105 inches. There is an average over much of that region of 70 or 80 inches. Thirty inches have been known to fall in one month, and 8 inches in one day. Under the conditions of thick, loose cover and the torrential rainfall you have ideal conditions for maximum erosional effects, as in a heavily wooded country, a country of forest-covered areas, erosion is at a minimum. But many a stream there, falling from an entirely forested basin, is often, when

at its highest stage, practically clear. It carries very little or no mineral matter, no clay, no sand, no bowlders, and it consequently expends its energy in getting a deep channel; it is an efficient water-way which reduces flood water effectually and rapidly. The lands are not wasted; nothing around is injured near it. Let the forest cover be removed, however, and we find that erosion steps in immediately. That erosion is of a number of types, which it is useless to take your time to detail to you.

The net effects are conditions that, in a few years, on the steep slopes—and I have seen them clear up to 40° in steepness, steep as the roof of a house, so steep that even an ox could not be sure-footed enough to plow on them, and they work with hoes among the rocks—the steep slopes, in a few years, serve to carry off the soil down into the bottoms. Those channels are filled up; the floods of a few years before that did no damage now flow over the entire bottom area, the only good lands the people have, cover them with sand or silt, or cover them with stones, or gouge them into holes and render them useless. This material not only does that, but it has worked its way on down those slopes and out into the navigable streams, away from the mountains. I will take the Tennessee River. It is the largest and most important one, and it is a fair type of the rest of them. At Knoxville, Tenn., the head of navigation on the river, 650 miles above its mouth, I found a Government fleet there—not one or two boats, but a fleet—engaged in dredging the channel and keeping it navigable. They dredge on a bar this summer, and they go back next summer and dredge the same bar. It fills up as fast as it is dredged out, and it is practically an unending work. They are receiving the effects of the erosion of the steep mountain slopes. They are helpless.

It is carried down there in greater quantities than the river can carry away, and it is a never-ending task to keep that material out of those streams. Those sand and gravel bars accumulate until they rise above water level. Willows begin catching on them, and it is not long before there is an island there; that island grows; the stream channel is split into two parts, begins cutting into the bank on each side, undermining and carrying away the bottom lands, carrying the houses, barns, etc. The island acts as a dam and above it holds the water, and we have slack water stretching for a number of miles above there; the natural fill becomes concentrated along the side of the island, and it is there that bars begin forming, and it is there that the United States Army engineers must step in and begin with their dams and locks and spend millions of dollars in improvement. If that island did not exist, the fill would be distributed uniformly along a long stretch of the river, and there would be no necessity for artificial aids to navigation. The island growth is very rapid in this last year. I found frequently testimony like this: "I knew that island as a boy; it was a small affair; but ten years ago or fifteen years ago it began rapidly growing, and to-day there is 150 acres, 200, or 300 or even more acres than that on it, cultivated land. There has developed a bar, and I have seen boats tie up at the foot of some of those islands during that state of the water that could not go by; it was necessary to wait for a rise." That condition is growing in the navigable stretches of the Tennessee River, fed by the streams that flow down from these steep mountain slopes

here westward, gathering into this great river which flows across Tennessee, touches Georgia, through northern Alabama, northern Mississippi, northward again across Tennessee, and across western Kentucky.

The same thing is true in other streams. I have here a table, which I will not read, giving the streams in the South that are navigable, the length of navigation in each one, and the total expenditures of the United States Government in 1790 to 1907, inclusive. On that Tennessee River over \$8,000,000 have been spent. Under present conditions there is no chance to permanently improve that navigable channel, because of the incessant inrush of the sand and gravel. If the material is checked before it ever starts, up in the mountains, and kept there by keeping forests on those steep slopes that ought never to be cleared, then the necessity for this constant dredging would be greatly decreased or perhaps obviated entirely. Merely as a business proposition, is it better to bale out sand forever from the stream and take no means for preventing it from getting in there, or is it better to go to the root of the trouble and hold the sand where it was made on those steep mountain slopes, and keep it from ever getting down into navigable streams? I have not time to speak further. You know all those other streams are in exactly similar conditions, and I could repeat the same thing and could give you any amount of detail, if you desired it and the time permitted. [Applause.]

STATEMENT OF GEORGE B. LEIGHTON, OF MONADNOCK, N. H.

Mr. LEIGHTON. I come to speak to you as vice-president of the American Civic Association, representing, directly and indirectly, about 150,000 members scattered throughout this land. Gentlemen, I do not speak of the economical side of this question. You have heard it ably discussed to-day. But I only come to say a word on the æsthetic and the sanitary problems involved. Every one of you have people in your district who go to the Appalachians and White Mountains in the summer time. It is a very important consideration for you to have health reservoirs, just as you have reservoirs for water. These great forest reservoirs will be health reservoirs of this country, and I can only say that New Hampshire has done her share in that direction. New Hampshire has built 120 miles of highway to make the White Mountains available for these people who come to seek health among her hills, at an expenditure from the State treasury of about \$300,000. She has done that almost entirely for the residents of other States, because that mileage is in a district but very sparsely inhabited, and those roads are used chiefly during four months of the year. What has been done there will be done elsewhere, and I have to submit to you simply a report from the State engineer's office showing how far she has done that. In addition, as Governor Floyd said, New Hampshire will no doubt supplement any action that may be taken by the National Government in purchasing cut-over land and assist in extending the forest area in our State. I do not know that I can add anything more, as the time is so limited, but I only desire to call attention to these great reserves as health reservoirs of this country. [Applause.]

STATEMENT OF HARVEY N. SHEPARD, OF BOSTON, MASS.

Mr. SHEPARD. Mr. Chairman and gentlemen, I do not appear in any sense as an expert, but simply as a citizen, representing, in part, the Commonwealth of Massachusetts, by appointment of its governor, and the State Board of Trade, which is a federation of all the business interests of Massachusetts, and as a member of the Appalachian Mountain Club, to which club I beg particularly to refer a few moments later. The governor of Massachusetts has a great interest in this matter. It is only the pressure of official duties which prevents his presence. He, however, has sent me a telegram, which I ask leave to give to the reporter that it may appear in the record as an expression of his views in favor of the enactment of this bill. The resolution of the State Board of Trade I put in earlier in the morning. I now ask leave to give to the reporter this memorandum showing the organization of the State Board, so that it may appear what organizations are interested.

The Commonwealth of Massachusetts, both in its State capacity and in its business interests, is a unit in favor of the passage of this bill. There is no dissension whatever. It is of vital importance to us. There are two rivers, the Connecticut and the Merrimac, the flow of the waters in which depends upon the forests of the White Mountains. There are 3,000 mills upon the Connecticut River. The Merrimac is the most notable development of water power for a stream of its length in the United States. The paper, the cotton, and the woolen mills are among the most valuable industries of this country. I need not repeat what has been said in regard to the effect upon the flow of water in these rivers if you destroy the sponge which holds back and keeps the water from coming down in a torrent and gives you simply a dry stream in the summer. What are we to do? Massachusetts has taken its mountains within its own limits. They belong to the State. They have been bought. The forests there are preserved. We can not go into New Hampshire and buy the White Mountains. We are not the only States interested there. We come to the nation as our only resource. Now, has the nation the right to give us this aid? On the 28th of June, 1879, Congress enacted a law providing for the building of dams and the construction of levees in order to make the Mississippi River safe and easy for navigation, to prevent floods, and to facilitate commerce and trade. The constitutional question was raised at that time, and there was a debate in the House over it, and it was decided by a vote of the House to be constitutional, and since that time every other Congress has passed an act in regard to the same matter.

In March, 1893, Congress again passed an act providing for dams above the navigable portions of the Sacramento and San Joaquin rivers, as navigable rivers, for the same purpose in order to preserve them as such. Under the commerce clause of the Constitution Congress goes on, year after year, and appropriates, in its river and harbor bill, for the dredging of bays and the dredging of rivers. If it can do these things, if it can buy lands for the construction of an artificial reservoir, certainly it can buy lands to prevent the destruction of a natural reservoir. If it can spend money in order to dredge

a river, it certainly can spend money in order to prevent the necessity of that dredging. I submit, therefore, that you have the power, under the Constitution of the United States, to pass this bill as something that comes in under the commerce clause, and if you have the power, then the means that you use are entirely within the discretion of Congress. The Kansas-Colorado case, of which mention has been made here, is not at all inconsistent with this view. That simply decided that the reclamation of arid land as an end is not within the power of the National Government. But the Supreme Court was very careful in its decision to say that it was simply because that was put as an end to be sought for and not as a means in order to achieve an end. If you had been seeking to save the navigation of the Arkansas River and had devised, as a means in order to do that, the reclamation of the arid land, then the Supreme Court of the United States has not said that that would be unconstitutional and illegal. If, then, in order to save the navigation of the Connecticut and the Merrimac rivers, you have the right to pass this bill, whether or not you shall pass it is a question of expediency which may depend upon other reasons. I have not the time at this late hour to present the whole constitutional argument, and I ask leave, therefore, to hand this written argument to the reporter, that it may appear in the record of the hearing here as a part of the remarks upon that question.

It is important, on the question of expediency, that this bill be passed, in order to preserve the manufactures and the timber supply of New England. The matter has been tried in France, Italy, and Switzerland, in order to save the rivers by dams and dredging, and it has been found by costly experience that the best means, the expert means, to do that is by the preservation of the forests, or the planting of forests at the headwaters. What has been done there might well be done here. So much for the material side.

The matter of business is important, but there is also another consideration, which is not to be measured in dollars and cents, and that is the value of these great mountain places as places of health resort, places where people may go because they need the inspiration of the mountains and because they need the benefit of the bracing air. There are 10,000,000 people within easy and accessible distance of the White Mountains, who come there year after year—clerks, teachers, people of small salaries—who can gain only a few days' vacation, and they get that exhilaration that comes to a man or a woman when he has climbed a high mountain and looks out upon the forests and all the beauties of nature. That is something that is worth more than any material consideration. It is something that can not be reckoned in money.

Let me say a word, in closing, of the Appalachian Mountain Club, of which I am a member. That is a club organized thirty years ago, in order to make accessible the peaks of the White Mountains. At that time there was only one—Mount Washington—that could be reached, and that by railroad. The first president was Professor Pickering, of Harvard University. Its presidents since then have largely come from Harvard and from the Massachusetts Institute of Technology. It has grown to seventeen hundred members, and it has made every peak in the White and Franconia range accessible, and all these paths are so well constructed that they may well challenge comparison with those of Switzerland. It owns to-day some fifteen

reservations, acquired partly by gift, partly by purchase, in these New England States, for the purpose of preserving the wood, the forests—in some cases the virgin forest—and this has all been done not for the benefit of the members of this club, but open to the whole community. The club simply looks to the care and expense of maintaining them so that everybody may have the benefit of walking out into the woods. If it be a matter of sentiment to you gentlemen, to appeal to you to save these mountains, I am not ashamed to say that on sentiment I am willing to base it. It is sentiment that led you to erect the statues in this beautiful Capitol. It is sentiment that causes you to love our flag. It is sentiment that caused you to buy the battlefield of Gettysburg, so that people may love the history of their country and be ever ready to defend it. I am ready to say that on sentiment I appeal to you to pass this bill, that we may enjoy these mountains, the crown of New England, not as big ugly rocks, but clothed in the beauty of the forest. [Great applause.]

(The telegram and constitutional argument referred to are printed in the appendix.)

Governor SMITH. Mr. Chairman and gentlemen, I desire, on behalf of those who are here, from Maine to Georgia, and as far west as Ohio, to thank you for the courteous hearing that you have given us. We believe that we come in support of a measure that has great national importance. We believe that we come in support of a measure that it is impossible to carry out except, first, by national action. It has been suggested by members of the committee that the States should handle the problem. That is an impossibility. The forest experts who have been before you have shown how impossible it is for South Carolina to handle her problem, and it is as impossible for North Carolina to handle hers. How impossible it is to expect West Virginia to handle the problem. The beneficial results would reach away over into Kentucky and into Indiana and into Illinois. How unreasonable it would be to ask North Carolina to handle the problem, when the streams there rising flow on down through Tennessee and Alabama, and back up through Tennessee and even to Paducah, Ky., and then down the Mississippi. The beneficial effects of this bill are so national in their character that it is utterly impossible to apportion the responsibility between the States where the land lies. I wish, however, to say to you in behalf of the governors of the States of the south Appalachian range—of West Virginia, of Kentucky, of Tennessee, of Alabama, of South Carolina, of North Carolina, and Virginia—that they have asked me to be here to speak for them as well as for myself. All of them, except two, have legislatures on hand and found it impossible to be here, and the other two had meetings fixed weeks ago of such importance that they could not leave. I have received letters from a number of them in the last three weeks, and I come to say to you from them, as well as from my own State, that when the nation takes hold of this great problem and does its part, then I believe you can readily expect to see the States follow in the line of your action and help handle nobly all that part of the responsibility which should properly fall upon the States. And, furthermore, with the inspiration of the United States Forest Service that will come from the national work, with the further stimulant of the local forestry work done by the States, we may well expect to see the people along the lines of these streams themselves inspired to make efforts that heretofore they would have been discouraged in making;

we may well expect to see them, inspired by national and State effort, responding on their small pieces of land, to carry on the good work to preserve the timber and to preserve the streams, so important to the welfare of our glorious country. [Great applause.]

Mr. Chairman and gentlemen, the last speaker has called your attention to the important problem of health. We have piled testimony from experts before you upon the problem of the timber. They have shown you that in these two ranges of mountains is now the last hope for that part of the country east of the Mississippi to preserve the timber for the future use of the people. We have lived so fast here, our resources have been so great, that we have been careless about them. Piling up wealth easily, we forget to conserve the natural resources of our country for those who are to come after us. I hold here in my hand pictures of what is has cost France. She is now spending \$50 an acre to try to stop the wash on the side of the mountain, that she may plant trees, and we come to ask you to spend a dollar an acre and buy the mountain sides before they are washed away, that the trees may continue to grow.

The lumber problem, gentlemen, is sufficient by itself to appeal to you as a national problem, but I pass at once to one of greater importance, perhaps, the problem of power. We consume our lumber, we consume our coal, then what are we to depend upon for power; what are we to depend upon for heat—the flow of our streams. The power to create electricity from our streams, if we will conserve them and preserve the source, must largely protect us from the waste of our coal and the waste of our lumber. The great manufacturing possibilities of the future of the country depend upon your action. I do not, gentlemen, urge at this time the reservoir system presented by your Government expert who spoke a few moments ago. That may be a question of the future. It may be one fifty years hence, and if you allow these forests to go, then your expert told us that you have taken away from the future the possibility of creating the enormous amount of additional power and creative force that could come from reservoirs as the result of the streams which the forest preserves. [Applause.]

Mr. Chairman and gentlemen, I come to the proposition of navigation. It is absolutely demonstrated before you that if we are to have inland waterways we must preserve the trees on the mountain sides, on both these ranges. Testimony comes to you from your employed experts. It comes to you from practical business men who have seen and who know. If this were a trial before a court, the testimony presented would require a verdict and the entry of a judgment that the navigable streams of this whole section rest for their future upon the preservation of the trees upon these mountain sides.

It is hardly necessary for me to add a word to the clear, simple, powerful presentation of the constitutional right. If you have the power to take the sand and the débris out of the stream, how can it be possible that you have not the constitutional power for keeping it from getting into the streams? [Applause.] Is it possible that our Constitution is one that gives you the right to dredge our harbors and dredge your navigable streams and spend your millions on it, and does not give you the power to buy a piece of land with a single expenditure that will save you the yearly expenditure? That you can not buy the land to stop the wash, but you can spend the money to clean out the dirt that the wash produces? The proposition shocks

mè. I have read the *Kansas v. Colorado* case. Not only does it fail to touch this case, for the reason given by the gentleman who just spoke, but it fails to touch it for another reason. In that case the proposition was to consume the water belonging to the riparian holders in Kansas for the use of irrigation in Colorado. Here, instead of taking something that belongs to somebody else, instead of the Government undertaking in one State to take something away in the shape of water from another State, you are proposing to help the people on every bank in every State through which the stream flows. [Applause.]

Mr. Chairman and gentlemen, I would not consume your time upon that subject or upon this case. The half hour extra that you gave us expires in about one minute more, and I will not pass beyond it. I believe, and I dare state it, although I am a strict constructionist, I believe that where there is a great national purpose to be subserved, a great national benefit to be done, without interfering with the rights of a State or the rights of an individual, the general welfare clause of our Constitution means something. [Applause.] I would not stretch it to invade the right of a State or the right of an individual, but where it is appealed to to serve the welfare of the people of the whole country I would be willing to plant myself upon it and say it means something.

Mr. Chairman and gentlemen, we thank you for this hearing. We come to you not only from all these States, but we perhaps come to you from more organizations of people disinterested, except moved by the desire to serve the country, than any gathering that ever appeared before a Congressional committee. Business organizations, women's organizations, patriotic organizations all over your land, not here to sell any land—not a man before you has a foot of land to sell—not a man before you has a thing to put off on the nation as a job, not a dollar is to be made by anybody who is here. They come as volunteers, moved by the love they have of their States and their country, because they feel that their section and their States and their nation have come in to lay the case before you.

Two years ago this cause was strong. I ask you, Mr. Chairman, if it is not ten times as strong to-day? We know that each year that slips by jeopardizes the cause for which we plead. We know that if you delay, you wreck, with unspeakable damage, the cause for which we plead; that the woodman's ax is destroying that which we would save, and we beg you, gentlemen, do not postpone it. You have heard us early in the session, in time to present this bill at the present Congress. It is not the next Congress we want to do it; it is this Congress, Mr. Chairman. [Great applause.] It is not a committee of men to think about it we are begging for; it is for authority for somebody to go and begin buying the ground, buying the stuff, and doing the work that we are asking you to report favorably for. Gentlemen, we leave it with you. We believe that we represent the best interests; we know that we represent the interests of the whole section of people east of the Mississippi. We believe that every day it is presented to them it will grow stronger and stronger. We believe there will become one swelling throb of thanks from every voice, except some one who has some constitutional doubts, and we do not think there are very many of them. We believe that you will render a service to your country, and we have come here to plead with you to do it now. [Great applause.]

STATEMENT OF MR. MICHAEL F. SULLIVAN, PRESIDENT OF THE BOARD OF TRADE OF LAWRENCE, MASS.

MR. SULLIVAN. I should have been here this morning, but lost my train. Our position, Mr. Chairman, is somewhat different from that of any other city on the line of the Merrimac. When we, as Americans, not as Cubans, or Hawaiians, or Zulus, ask your protection of the forest, we simply ask you to allow us to exist. The city of Lawrence has 80,000 people, and it is growing at the rate of three or four thousand a year. Within a mile and a half are 20,000 more people, so we have in all about 100,000 people. We not only live by the stream, which turns the wheels, but we drink the water of that river, we live on it practically. We are obliged to filter this water at an expense of nearly \$200,000 for filter galleries, the first in this country. We have purified our water so that it is almost absolutely pure, and we depend on this river for our fire purposes, depend on it for our drinking, depend on it for our existence.

I was asked by the city government, the board of trade, to come here to-day to ask you to help to preserve our water supply. We depend on this river. If you allow the forests to be destroyed, you destroy the city of Lawrence. This is a peculiar position, but you know that if we were to ask you to-day to protect our city against the approach of enemies to destroy it Congress would appropriate millions of dollars. We ask you now in peace to preserve the means by which we exist. Our position is peculiar. We live on this river, we depend on it for drinking, for turning the machinery, and for other purposes. Therefore, our position is emphasized because the river is the basis of our existence. We have been up in the mountains ourselves, we have seen the hand of the axman, we have seen fire destroying the forests, we have seen the water growing gradually lower and lower. If you allow the forests to be destroyed, we are going to have the Merrimac a large, open, badly drained sewer. We ask you as Americans to allow us to exist; we ask you to give consideration to this matter, because to us it is of vital importance. You can see where we have over seventy millions of money invested; we have 60,000 people in the shops of Lawrence. We are all working people, those who work directly in our factories and those who live on them. I know that if any island should demand American assistance tomorrow to free it or place it in a position to take care of itself the Government would be quick to do it. Now we ask you, as American citizens, to allow us to exist, by saying and doing that which is within the bounds of every Government, to protect its own subjects.

STATEMENT OF M. J. HAPGOOD, OF VERMONT.

MR. HAPGOOD. I do not think it would be proper to allow this thing to go without a word from Vermont, and I was delegated by the governor of that State and the forest association to appear here in their behalf. What I shall say will be brief.

We claim that Vermont has a deep and lasting interest in this question. No doubt all of you gentlemen have been familiar from your childhood with the fact that we are bordered entirely upon the east by the Connecticut River. The chief and leading industries of

our State are dependent upon the water powers of that river, especially at Bellows Falls, where there is a capital of \$5,000,000 invested and a fall of 50 feet in the river. Just below they are establishing a plant, in the southeast corner of the State, at Brattleboro, upon which they are expending \$1,000,000 for the dam alone.

Mr. HASKINS. To develop 16,000 horsepower.

Mr. HAPGOOD. Yes; to develop 16,000 horsepower, which they intend to distribute to all the manufacturing places around. So, gentlemen, we claim that Vermont has an interest here, and not only from this mercenary point of view, but from the sentimental, if you please. Our State is covered with mountains which I think we must take care of. But, gentlemen, when we climb the sides of those mountains and look over the valley across the river, we do not want to look over upon a mass which is desecrated and desolate. I do not shrink to ask the question, Shall we allow these grand, majestic peaks, the Presidential Range, to become naked and desolate, merely from the fact that we may not see now a pecuniary consideration, the expense necessary for their preservation? That is all.

The CHAIRMAN. Governor Smith, on behalf of the committee. I wish to acknowledge the courteous expressions of sentiment to which you have just given utterance, and to say on our behalf that we feel indebted to you for the very clear, concise, comprehensive, and businesslike presentation which you have made before us to-day. I think I violate no confidence in saying that sometimes this committee, as do all committees, approaches a hearing with other feelings than those of pleasure and sits through it with whatever of fortitude it may be able to command; but I am sure my colleagues on the committee will agree with me that there has not been a dull moment in this day's hearing, and whatever the verdict of the committee eventually may be—and I am sure you will recognize the impropriety of my even attempting to forecast it at this time—I do not venture anything when I say that there is no one member of the committee who does not fully recognize the importance of the question.

If any of us had had any doubt prior to to-day as to the importance of this great problem, that doubt has been dissipated, not only—indeed, I might say, not even chiefly—by what has been said to-day, strong and emphatic as the words have been, but by the presence here to-day of this representative gathering of the business men and the representatives of business men of twenty of the States of this Union. Not only have business men come here, but others, such as yourself, Governor Smith, who have received from their States the highest honors they had to give, and who have, by reason of high character and great ability, received national recognition. The fact that such men as these have come before us to plead for any cause is enough to impress any committee with the importance of that cause. I therefore close with an expression of our appreciation, as I have said, for your attendance here to-day and for the information you have brought us, and assure you that the measure which has commanded your enthusiastic advocacy will receive our earnest and careful and patriotic consideration. [Great applause.]

(Thereupon, at 4.45 o'clock p. m., the committee adjourned until to-morrow, January 31, 1908, at 10 o'clock a. m.)

APPENDIX TO HEARINGS ON APPALACHIAN AND WHITE MOUNTAIN FOREST RESERVES.

List of delegates to Congressional hearing for Appalachian National Forest Reserve.

APPALACHIAN NATIONAL FOREST ASSOCIATION.

Ligon Johnson, president.
John H. Finney, secretary and treasurer.
R. Gordon Finney, assistant secretary.

STATE OF GEORGIA.

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| Hon. Hoke Smith, governor of the State. | W. E. Small, Macon. |
| Maurice W. Thomas, Atlanta. | W. E. McCaw, Macon. |
| Asa G. Candler, Atlanta. | T. J. Simmons, Macon. |
| Joel Hurt, Atlanta. | W. A. Little, Columbus. |
| Sam D. Jones, Atlanta. | Fred. B. Gordon, Columbus. |
| Maj. John S. Cohen, Atlanta. | Gunby Jordan, Columbus. |
| W. G. Cooper, Atlanta. | Leo. Lowenherz, Columbus. |
| Hugh M. Willett, Atlanta. | W. C. Bradley, Columbus. |
| Harvie Jordan, Atlanta. | J. D. Massey, Columbus. |
| Will H. Shippen, Atlanta. | Linton A. Deane, Rome. |
| Isaac Haas, Atlanta. | Barry Wright, Rome. |
| R. J. Griffin, Atlanta. | Seaborn Wright, Rome. |
| F. L. Seeley, Atlanta. | J. Lindsay Johnson, Rome. |
| Ralph Smith, Atlanta. | W. F. Dorsey, Athens. |
| Oscar Pappenheimer, Atlanta. | Frank Shackelford, Athens. |
| John S. Corrigan, Atlanta. | Paul Gilreath, Cartersville. |
| Forrest Adair, Atlanta. | Paul Akin, Cartersville. |
| E. F. Morgan, Atlanta. | C. P. Goodyear, Brunswick. |
| J. J. Spalding, Atlanta. | H. H. Dean, Gainesville. |
| F. H. Hadley, Atlanta. | John A. Smith, Gainesville. |
| B. M. Hall, Atlanta. | H. A. Meikleham, Lindale. |
| A. R. Colcord, Atlanta. | A. S. J. Stovall, Elberton. |
| A. M. Whaley, Atlanta. | A. M. Kitchins, Cornelia. |
| Walter P. Andrews, Atlanta. | Luke E. Tate, Tate. |
| Samuel Dunlap, Atlanta. | Charles Barret, Union City. |
| J. H. McGowan, Augusta. | J. S. Adams, Demorest. |
| Oswell R. Eeve, Augusta. | Dr. Jeff Davis, Toccoa. |
| Rowdrie Philinz, Augusta. | Dr. L. G. Hardman, Commerce. |
| Thos. W. Lovless, Augusta. | Smith D. Pickett, Albany. |
| I. T. Hickman, Augusta. | Claude N. Bennett, Thomson. |

STATE OF VIRGINIA.

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| Rorer A. James, Danville. | A. McG. Griggs, Portsmouth. |
| R. P. Barham, Petersburg. | C. E. Thacker, Newport News. |
| S. S. Nottingham, Norfolk. | M. H. Claytor, Roanoke. |
| J. H. Lindsey, Charlottesville. | John S. Bryan, Richmond. |

STATE OF WEST VIRGINIA.

| | |
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| W. B. Matthews, Charleston. | Hon. W. P. Hubbard, Washington, D. C. |
| Col. C. B. Kefauver, Parkersburg. | Hon. Jos. H. Gaines, Washington, D. C. |
| R. B. Naylor, Wheeling. | Hon. Harry Woodyard, Washington, D. C. |
| L. J. Corbly, Huntington. | Hon. James A. Hughes, Washington, D. C. |
| Hugh Shapps, Bluefields. | Hon. S. B. Elkins, Washington, D. C. |
| L. C. Lough, Fairmount. | Hon. N. B. Scott, Washington, D. C. |
| Prof. M. S. Hodges, Morgantown. | Secretary J. B. Garvin, Charlestown. |
| Hon. Harvey W. Harmor, Parkersburg. | Isaac T. Mann, Bramwell. |
| Hon. Stewart W. Walker, Martinsburg. | Amos Bright, Sutton. |
| Howard Sutherland, Elkins. | William D. Ord, Landgraaf. |
| Director James H. Stewart, Morgantown. | Col. Edward O'Toole, Gary. |
| Prof. Henry S. Green, Morgantown. | Hon. S. W. Willey, Hinton. |
| Hu Maxwell, Washington, D. C. | Hon. H. I. Shott, Bluefield. |
| Hon. Geo. C. Sturgiss, Washington, D. C. | |

List of delegates to Congressional hearing for Appalachian National Forest Reserve—Continued.

STATE OF SOUTH CAROLINA.

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| Prof. A. C. Moore, Columbia. | Thomas A. Ratliff, Anderson. |
| Dr. J. A. B. Scherer, Newberry. | H. N. Snyder, Spartansburg. |
| W. C. Woods, Darlington. | Prof. B. E. Geer, Greenville. |
| James F. Neville, Walhalla. | Hon. A. C. Kaufman, Charleston. |
| E. H. De Camp, Gaffney. | |

EXECUTIVE COMMITTEE FROM SOUTH CAROLINA.

E. J. Watson, Columbia, S. C.

STATE OF NORTH CAROLINA.

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| J. P. Lucas, Winston-Salem. | Geo. B. Crater, Raleigh. |
| W. I. Underwood, Greensboro. | E. R. Preston, Charlotte. |
| Benj. Bell, Wilmington. | John T. Patrick, Wadesboro. |
| James H. Caine, Asheville. | Wade H. Harris, Charlotte. |
| James A. Robinson, Durham. | W. S. Lee, Charlotte. |
| J. J. Fariss, High Point. | |

STATE OF KENTUCKY.

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| W. H. Mackoy, Covington. | W. E. Burk, Louisville. |
| Robt. A. McDowell, Louisville. | Professor Marks, Louisville. |
| Col. J. B. Atkinson, Earlington. | Webster Gazley, Louisville. |
| A. T. McDonald, Louisville. | J. M. Johnson, Louisville. |
| Frank H. Hartwell. | Frank H. Miller, Louisville. |
| Geo. A. Newman, Louisville. | Lafon Allen, Louisville. |
| Prof. H. T. Brownell, Louisville. | |

STATE OF ALABAMA.

Hon. J. H. Wallace, Alabama Forestry Commission.
 Hon. J. A. Wilkinson, Alabama Forestry Commission.

STATE OF TENNESSEE.

L. C. Glenn, Vanderbilt University, Nashville.
 Saml. B. Smith, Chattanooga.

Delegation present from New England at hearing on Appalachian bill before Committee on Agriculture of House of Representatives, January 30, 1908.

Phillip W. Ayres, forester Society Protection of New Hampshire Forests; forester Dartmouth College grant.

Henry A. Barker, department vice president "Public Reservations," American Civic Association, representing mayor of Providence, Providence Board of Trade, and League of Improvement Societies in Rhode Island.

Robert P. Bass, New Hampshire forestry commissioner.

George Ward Cook, Haverhill, Mass., representing interests in the Merrimac Valley.

F. B. Davis, Lawrence, Mass., lumber manufacturer.

Thomas H. Dearborn, Concord, N. H., state entomologist.

C. F. De Forest, New Haven, Conn., representing Connecticut Lumber Association and State of Connecticut.

F. C. Dumaine, treasurer Amoskeag Manufacturing Company, of Boston.

Charles L. Elwell, Concord, N. H., recently speaker house of representatives.

R. E. Faulkner, Keene, N. H., New Hampshire forestry commissioner.

G. W. Field, chairman commission on fisheries and game, Boston.

Charles M. Floyd, Manchester, N. H., governor of New Hampshire.

C. C. Goodrich, Hartford, Conn., manager Hartford and New York Transportation Company.

H. S. Graves, New Haven, Conn., director Yale Forest School and State delegate.

James P. Gray, Boston, hydrographic enquirer, president Boston Manufacturers Insurance Company.

M. J. Hapgood, Peru, Vt., representing the governor and State Forestry Association.

Henry R. Hayes, representing Stone & Webster, electrical engineers, 147 Milk street, Boston.

E. F. Hitchins, Waterville, Me., state entomologist.

D. Blakeley Hoar, Brookline, Mass. Appointed by governor of Massachusetts.

Prof. John G. Jack, forest department, Harvard University.

Harlan P. Kelsey, Salem, Mass., vice president department of nuisances, American Civic Association, president Civic League of Salem, Mass.

Lieutenant-Governor Lake, Hartford, Conn.

A. E. Lang, Cornish, N. H.

George B. Leighton, vice-president American Civic Association, Monadnock Farms, New Hampshire.

Arthur Low, Fitchburg, Mass., president Park Hill and Lancaster Manufacturing Companies. Appointed by governor of Massachusetts.

J. Horace McFarland, Harrisburg, Pa., president American Civic Association.

Hon. John McLane, ex-governor of New Hampshire, Milford, N. H.

William A. Martin, Holton, Me.

George F. Mead, Boston, Boston Fruit and Produce Exchange and Boston Associated Board of Trade.

Rev. Daniel Merriman, 73 Bay State Road, Boston. Appointed by governor of Massachusetts.

F. W. Rane, State forester, State House, Boston, Mass. Appointed by governor of Massachusetts.

F. Gardner Richards, Rockport, Mass.

Frank W. Rollins, ex-governor of New Hampshire, president Society for Protection of New Hampshire Forests.

Harvey N. Shepard, Boston, representing Commonwealth of Massachusetts, Massachusetts State Board of Trade, Appalachian Mountain Club.

Edwin A. Start, secretary Massachusetts Forestry Association, representing that association and Commonwealth of Massachusetts.

Dr. M. F. Sullivan, president of the Board of Trade of Lawrence, Mass.

Dr. George F. Swaine, professor of civil engineering Massachusetts Institute of Technology, member Boston Transit Commission, representing State of Massachusetts.

James P. Tolman, Boston, Mass. Appointed by governor of Massachusetts.

Justin E. Varney, Lawrence, Mass., cashier Bay State National Bank.

C. J. H. Woodbury, Boston, secretary National Cotton Manufacturers' Association. Appointed by governor of Massachusetts.

Charles T. Woods, director Maine Agricultural Experiment Station, Orono, Me.

Mr. Chairman and gentlemen of the Agricultural Committee, I am here as one of the delegates representing the State of Connecticut, by appointment of Governor Woodruff, and also as a delegate from the Chamber of Commerce of New Haven, to make a brief plea in favor of this bill. We of Connecticut are profoundly impressed with the economic importance of conserving and developing what remains of the forest resources in the southern and eastern sections of our country and with the necessity for immediate action upon these lines.

During the past four or five years that we have been asking Congress to grant this measure, a mass of testimony and argument has been accumulated in its favor well nigh overwhelming, all of which is now gathered up and rounded out by the masterly, and conclusive special report of the Secretary of Agriculture made to this Sixtieth Congress. It does not seem to be assuming too much to say that the arguments are all in; they are irrefutable—urgent. The only thing that can be said now is that the longer this matter is postponed the more irreparable the damage becomes and the greater and more costly the undertaking when it is once inaugurated, and sooner or later inaugurated it must be. It can not as a national policy of prime importance be postponed long.

We are convinced that it can only be solved by the cooperative action of both Federal and State governments, and by that of the owners of the forest lands which may be needed. The present bill is wise and practical because it bespeaks such united action. Briefly summarized this is the solid and sober verdict of Connecticut.

The State of Connecticut by resolution in its last general assembly has already unanimously indorsed its provisions. Ex-Governor Henry Roberts and Governor Rollin S. Woodruff have repeatedly urged such action. The chambers of commerce and boards of trade in all of our leading cities, not only of my State, but of New England, have done likewise; a large portion of the influential newspapers of New England have favored it again and again.

You are also familiar with the favorable action of the Connecticut River transportation companies, and also of the State lumbermen's associations, of Massachusetts, Rhode Island, and Connecticut, and many other associations. New England is actively and solidly arrayed on the side of this legislation. We have yet to discover one iota of opposition.

May I call your attention to the Century Magazine for February, wherein you will find the testimony of all the governors of the New England, Middle, and Southern States uniting in one powerful plea for favorable Congressional action upon this great question. We earnestly appeal to you, therefore, gentlemen, for a speedy and favorable report.

CHARLES S. DEFOREST,
*Delegate for the State of Connecticut and for
the Chamber of Commerce, New Haven, Conn.*

WASHINGTON, January 30, 1908.

CHAMBER OF COMMERCE OF NEW HAVEN,
January 28, 1908.

CHARLES S. DEFOREST, Esq.,
New Haven, Conn.

DEAR MR. DEFOREST: I take pleasure in officially notifying you that you have been appointed to represent the Chamber of Commerce of New Haven before the Committee on Agriculture of the United States House of Representatives in the matter of the bill now pending before Congress for the establishment of a forest reserve in the White Mountains and the Appalachian Mountains.

As you know, the chamber of commerce stands unanimously in favor of this bill, and by appropriate resolutions has twice expressed to the Connecticut delegation in Congress the urgent necessity of establishing these reserves.

Hoping that you will be able to make a favorable report to the chamber upon this important matter, I remain,

Yours, very truly,

JOHN CURRIER GALLAGHER,
Secretary.

ALABAMA.

[No. 90. H. 67.]

SECTION 184. That the consent of the State of Alabama be, and is hereby, given to the acquisition by the United States, by purchase or gift, or by condemnation according to law, of such land in Alabama as in the opinion of the Federal Government may be needed for the establishment of such a national forest reserve in this region: *Provided*, That the State shall retain a concurrent jurisdiction with the United States in and over such lands so far that civil process in all cases and such criminal process as may issue under the authority of the State against any person charged with a commission of any crime without or within said jurisdiction, may be executed thereon in like manner as if this act had not been passed. In all condemnation proceedings the right to the Federal Government shall be limited to the specific objects set forth by the laws of the United States in regard to forest reserves. That power is hereby conferred upon Congress to pass such laws and to make or provide for the making of such rules and regulations of both civil and criminal nature, and provide punishment for violation thereof as in its judgment may be necessary for the management, control, and protection of such lands as may from time to time be acquired by the United States under the provisions of this act.

Approved November 30, 1907.

GEORGIA.

AN ACT to give consent by the State of Georgia to the acquisition by the United States of such lands as may be needed for the establishment of a national forest reserve in said State.

Whereas it is proposed that the Federal Government establish in the high mountain regions of Georgia and adjacent States a national forest reserve, which will perpetuate these forests and forever preserve the headwaters of many important streams, and which will thus prove of great and permanent benefit to the people of this State; and whereas a bill has been introduced in the Federal Congress providing for the purchase of such lands for said purpose, the general assembly of Georgia do enact:

SECTION 1. That the consent of the State of Georgia be, and is hereby, given to the acquisition by the United States, by purchase or gift, or by condemnation according to the law, of such lands in the mountain region of Georgia as in the opinion of the Federal Government may be needed to the establishment of such a national forest reserve in that region: *Provided*, That the State shall retain a concurrent jurisdiction with the United States in and over such lands so far that civil process in all cases, and such criminal process as may issue under the authority of the State against any person charged with the commission of any crime without or within said jurisdiction, may be executed in like manner as if this act had not been passed: *And provided*, That in all condemnation proceedings the rights of the Federal Government shall be limited to the specific objects set forth by the laws of the United States in regard to forest reserves.

SEC. 2. That power is hereby conferred upon Congress to pass such laws as it may deem necessary to the acquisition as hereinbefore provided, for incorporation in said national forest reserves, of such mountain lands lying in Georgia as in the opinion of the Federal Government may be needed for this purpose.

SEC. 3. Power is hereby conferred upon Congress to pass such laws and to make or provide for the making of such rules and regulations, of both civil and criminal nature, and provide punishment therefor, as in its judgment may be necessary for the management, control, and protection of such land as may be from time to time acquired by the United States under the provisions of this act.

This act shall be in force from its passage.

Passed December 13, 1901.

VIRGINIA.

Resolved by the Senate of Virginia, the House of Delegates concurring, That the general assembly of Virginia hereby expresses its approval of the movement looking to the establishment by the Federal Government of an extensive national forest in the southern Appalachian Mountain region as a wise and beneficent measure, such as many other nations have already adopted and which this country has already adopted in the West and should adopt in the East before it is too late, looking to the conservation of its forests and the protection of the sources of important streams; and

Whereas, the proposal to establish this forest reserve has been approved and urged by the leading scientific and forestry associations of this country and by both the general and technical press; and

Whereas, the general assembly of Virginia has already passed an act granting the State's consent to the acquisition of lands in Virginia by the Federal Government for incorporation in such a forest reserve, believing the reserve to be one of great importance to the people of this State; and

Whereas, a bill is now before the Federal Congress providing for the purchase of lands for this purpose:

Resolved, That the Senators and Representatives in Congress from this State are hereby requested to urge upon Congress the importance of prompt and favorable action in behalf of this measure, and that copies of this resolution be sent to the Senators and Representatives from Virginia.

Passed unanimously by the legislature of Virginia March 21, 1902.

AN ACT to give consent by the State of Virginia to acquisition by the United States of such lands as may be needed for the establishment of a national forest reserve in the said State. Approved February 15, 1901.

Whereas it is proposed that the Federal Government establish in the high mountain regions of Virginia and adjacent States a national forest reserve, which will perpetuate these forests forever and preserve the headwaters of

many important streams, and which will prove of great and permanent benefit to the people of this State; and

Whereas a bill has been introduced in the Federal Congress providing for the purchase of such lands for said purpose: Therefore

Be it enacted by the general assembly of Virginia, That the consent of the State of Virginia be, and is hereby, given to the acquisition by the United States, by purchase or gift, or by condemnation according to law, of such lands in Virginia as in the opinion of the Federal Government may be needed for the establishment of such a national forest reserve in that region: *Provided,* That the State shall retain a concurrent jurisdiction with the United States in and over such lands so far as that civil process in all cases, and such criminal process as may issue under the authority of the State against any person charged with the commission of any crime without or within said jurisdiction, may be executed thereon in like manner as if this act had not been passed: *And provided,* That in all condemnation proceedings the rights of the Federal Government shall be limited to the specific objects set forth by the laws of the United States in regard to forest reserves.

2. That the power is hereby conferred upon Congress to pass such laws as it may deem necessary to the acquisition, as hereinbefore provided, for incorporation in said national forest reserve such forest-covered lands lying in Virginia as in the opinion of the Federal Government may be needed for this purpose.

3. Power is hereby conferred upon Congress to pass such laws and to make or provide for the making of such rules and regulations of both civil and criminal nature, and provide punishment for violation thereof, as in its judgment may be necessary for the management, control, and protection of such lands as may be from time to time acquired by the United States under the provisions of this act.

4. This act shall be in force from its passage.

(For resolution of March 21, 1902, see p. 190.)

NORTH CAROLINA.

AN ACT to give consent by the State of North Carolina to the acquisition by the United States of such lands as may be needed for the establishment of a national forest reserve in said State.

Whereas it is proposed that the Federal Government purchase lands in the high mountain regions of western North Carolina and adjacent States for the purpose of establishing there a national forest reserve which will perpetuate these forests and forever preserve the headwaters of many important streams, and which will thus prove of great and permanent benefit to the people of this State; and whereas a bill has been introduced in the Federal Congress providing for the purchase of such lands for said purpose: Therefore, the general assembly of North Carolina do enact:

SECTION 1. That the consent of the general assembly of North Carolina be, and is hereby, given to the acquisition by the United States, by purchase or by condemnation, with adequate compensation except as hereinafter provided, of such lands in western North Carolina as in the opinion of the Federal Government may be needed for the establishment of such a national forest reserve in that region: *Provided,* That the State of North Carolina shall retain a concurrent jurisdiction with the United States in and over such lands so far that civil process in all cases and such criminal process as may issue under the authority of the State of North Carolina against any person charged with the commission of any crime without or within said jurisdiction may be executed thereon in like manner as if this act had not been passed.

SEC. 2. That power is hereby conferred upon Congress to pass such laws as it may deem necessary to the acquisition as hereinafter provided for incorporation in said national forest reserve such forest-covered lands lying in western North Carolina as in the opinion of the Federal Government may be needed for this purpose: *Provided,* That as much as 200 acres of any tract of land occupied as a home by bona fide residents in this State at the date of the ratification of this act shall be exempt from the provisions of this section.

SEC. 3. Power is hereby conferred upon Congress to pass such laws and to make or provide for the making of such rules and regulations of both civil and criminal nature, and provide punishment therefor, as in its judgment may be deemed necessary for the management, control, and protection of such lands as may be from time to time acquired by the United States under the provisions of this act.

SEC. 4. This act shall be in force from and after its ratification. In the general assembly, read three times, and ratified this the 18th day of January, A. D. 1901.

W. D. TURNER,
President of the Senate.
WALTER E. MOORE,

Speaker of the House of Representatives.

A RESOLUTION favoring the establishment of a national forest reserve in the southern Appalachian region.

Resolved by the House of Representatives, the Senate concurring: The general assembly of North Carolina hereby expresses its approval of the movement looking to the establishment by the Federal Government of an extensive national forest reserve in the southern Appalachian Mountain region as a wise and beneficial measure, such as many other nations have already adopted, and which this country should adopt before it is too late, looking to the conservation of its forests and the protection of the source of important streams; and

Whereas the proposal to establish this forest reserve has been approved and urged by the leading scientific societies and forestry associations of this country, and by the general press; and

Whereas this general assembly has passed an act granting its consent to the acquisition of lands in western North Carolina by the Federal Government for incorporation in such a forest reserve, believing the reserve to be one of great importance to the people of this State; and

Whereas a bill is now before the Federal Congress providing for the purchase of lands for this purpose:

Resolved, That the Senators and Representatives in Congress from this State are hereby requested to urge upon Congress the importance of prompt and favorable action in behalf of this measure.

In the general assembly, read three times and ratified this the 18th day of January, A. D. 1901.

W. D. TURNER,
President of the Senate,
WALTER E. MOORE,

Speaker of the House of Representatives.

NEW HAMPSHIRE.

[Resolves of 1903, chapter 137.]

Whereas certain permanent and summer residents of this State have taken steps to memorialize Congress for the establishment of a national forest reserve in the White Mountain region; and

Whereas the establishment of such a reserve would perpetuate valuable forest growths and forever preserve the headwaters of several important streams and thus benefit the commerce, industry, and agriculture of all the New England States save one; and

Whereas the White Mountain region is of increasing importance as a pleasure resort to fully one-quarter of the entire population of the country, who reside within easy reach of it: Therefore be it

Resolved by the Senate and House of Representatives in general court convened, That the legislature of New Hampshire hereby expresses its approval of the proposition to establish a White Mountain national forest reserve.

That the consent of the State of New Hampshire be, and is hereby, given to the acquisition by the United States by purchase, gift, or condemnation according to law of such lands in this State as in the opinion of the Federal Government may be needed for the establishment of a national forest reserve in the White Mountain region.

That power is hereby conferred upon Congress to pass such laws as it may deem necessary to the acquisition of lands in this State for the purpose of such national forest reserve.

That power is hereby conferred upon Congress to pass such laws, and make and provide for the making of such rules and regulations of both civil and criminal nature and provide punishment for the violation thereof, as in its judgment, may be necessary for the management, control, and protection of such lands as may from time to time be acquired by the United States under the

provision of this point resolution: *Provided*, That the State of New Hampshire shall retain a concurrent jurisdiction with the United States in and over such lands so far as that civil process in all cases and such criminal process as may issue under the authority of the State against any person charged with the commission of crime without or within said jurisdiction, may be executed therein in like manner as if this joint resolution had not been passed.

That the Senators and Representatives in Congress from this State are hereby requested to urge upon Congress the importance of prompt and favorable action on behalf of the proposition to establish a White Mountain national forest reserve.

Approved January 20, 1908.

TENNESSEE.

A RESOLUTION favoring the establishment of a national forest reserve in the southern Appalachian Mountain region.

Resolved by the House of Representatives, the Senate concurring: The general assembly of Tennessee hereby expresses its approval of the movement looking to the establishment by the Federal Government of an extensive national forest reserve in the Southern Appalachian Mountain region as a wise and beneficent measure, such as many other nations have already adopted, and which this country has already adopted in the West and should adopt in the East before it is too late, looking to the conservation of its forests and the protection of the sources of important streams: and

Whereas the proposal to establish this forest reserve has been approved and urged by the leading scientific societies and forestry associations of this country and by the general press; and

Whereas this general assembly has before it a bill granting the State's consent to the acquisition of lands in eastern Tennessee by the Federal Government for incorporation in such a forest reserve, believing the reserve to be one of great importance to the people of this State; and

Whereas a bill is now before the Federal Congress providing for the purchase of lands for this purpose:

Resolved, That the Senators and Representatives in Congress from this State are hereby requested to urge upon Congress the importance of prompt and favorable action in behalf of this measure.

Adopted February 1, 1901.

E. B. WILSON,

Speaker of the House of Representatives.

NEWTON H. WHITE,

Speaker of Senate.

AN ACT to give consent by the State of Tennessee to the acquisition by the United States of such lands as may be needed for the establishment of a national forest reserve in the said State.

Whereas it is proposed that the Federal Government establish in the high mountain regions of eastern Tennessee and adjacent States a national forest reserve, which will perpetuate these forests and forever preserve the headwaters of many important streams, and which will thus prove the great and permanent benefit to the people of this State; and whereas a bill has been introduced in the Federal Congress providing for the purchase of such lands for said purpose: Therefore,

Be it enacted by the General Assembly of the State of Tennessee:

SECTION 1. That the consent of the State of Tennessee be, and is hereby, given to the acquisition by the United States, by purchase, gift, or condemnation according to law, of such lands in this State as in the opinion of the Federal Government may be needed for the establishment of such a national forest reserve in that region:

Provided, That the State shall retain the concurrent jurisdiction with the United States in and over such lands, so far that civil process in all cases, and such criminal process as may issue under the authority of the State against any person charged with the commission of any crime without or within said jurisdiction, may be executed thereon in like manner as if this act had not been passed:

Provided further, That this act shall apply to lands in Tennessee lying within twenty miles of the North Carolina State line; that all condemnation proceedings herein provided shall be limited to lands now forest covered, and that in all such condemnation proceedings the right of the Federal Government shall be limited to the specific objects set forth in this act and in the laws of the United States in regard to forest reserves.

SEC. 2. *Be it further enacted*, That power is hereby conferred upon Congress to pass such laws as it may deem necessary to the acquisition, as hereinbefore provided, for incorporation in said national forest reserve such forest-covered lands lying in the State as in the opinion of the Federal Government may be needed for this purpose.

SEC. 3. *Be it further enacted*, That power is hereby conferred upon Congress to pass such laws and to make or provide for the making of such rules and regulations of both civil and criminal nature, and provide punishment for violation thereof, as in its judgment may be necessary for the management, control, and protection of such lands as may be from time to time acquired by the United States under the provisions of this act.

SEC. 4. *Be it further enacted*, That this act take effect from and after its passage, the public welfare requiring it.

Passed April 16, 1901.

E. B. WILSON,
Speaker of the House of Representatives.

NEWTON H. WHITE,
Speaker of the Senate.

Approved April 23, 1901.

BENTON McMILLAN, *Governor.*

MAINE.

[Resolves of 1903, chapter 102.]

Whereas certain permanent and summer residents of this State have taken steps to memorialize Congress for the establishment of a national forest reserve in the White Mountain region; and

Whereas the establishment of such a reserve would perpetuate valuable forest growths and forever preserve the headwaters of several important streams and thus benefit the commerce, industry, and agriculture of all the New England States save one; and

Whereas the White Mountain region is of increasing importance as a pleasure resort to fully one-quarter of the entire population of the country who reside within easy reach of it: Therefore be it

Resolved by the Senate and House of Representatives in general court convened, That the legislature of Maine hereby expresses its approval of the proposition to establish a White Mountain national forest reserve.

That the consent of the State of Maine be, and is hereby, given to the acquisition by the United States by purchase, gift, or condemnation according to law of such lands in this State as in the opinion of the Federal Government may be needed for the establishment of a national forest reserve in the White Mountain region.

That power is hereby conferred upon Congress to pass such laws and make and provide for the making of such rules and regulations of both civil and criminal nature and provide punishment for the violation thereof, as in its judgment may be necessary for the management, control, and protection of such lands as may from time to time be acquired by the United States under the provisions of this joint resolution: *Provided*, That the State of Maine shall retain a concurrent jurisdiction with the United States in and over such lands so far as that civil process in all cases and such criminal process as may issue under the authority of the State against any person charged with the commission of crime without or within said jurisdiction, may be executed therein in like manner as if this joint resolution had not been passed.

That the Senators and Representatives in Congress from this State are hereby requested to urge upon Congress the importance of prompt and favorable action on behalf of the proposition to establish a White Mountain national forest reserve.

Approved March 28, 1902.

SOUTH CAROLINA.

A RESOLUTION favoring the establishment of a national forest reserve in the Southern Appalachian Mountain region.

Resolved by the House of Representatives, the Senate concurring: The general assembly of South Carolina hereby expresses its approval of the movement looking to the establishment by the Federal Government of an extensive national forest reserve in the Southern Appalachian Mountain region as a wise and beneficent measure, such as many other nations have already adopted, and which this country should adopt before it is too late, looking to the conservation of its forests and the protection of the sources of important streams; and whereas the proposal to establish this forest reserve has been approved and urged by the leading scientific societies and forestry associations of this country, and by the general press; and whereas this general assembly has passed an act granting its consent to the acquisition of lands in northern South Carolina by the Federal Government for incorporation in such a forest reserve, believing the measure to be one of great importance to the people of this State; and whereas a bill is now before the Federal Congress providing for the purchase of lands for this purpose:

Resolved, That the Senators and Representatives in Congress from this State are hereby requested to urge upon Congress the importance of prompt and favorable action in behalf of this measure.

Ratified. South Carolina Code 1902, sec. 11.

AN ACT to give consent by the State of South Carolina to the acquisition by the United States of such lands as may be needed for the establishment of a national forest reserve in said State.

Whereas it is proposed that the Federal Government establish in the high mountain region of South Carolina and adjacent States a national forest reserve which will perpetuate these forests and forever preserve the headwaters of many important streams, and which will thus prove of great and permanent benefit to people of this State; and whereas a bill has been introduced in the Federal Congress providing for the purchase of said lands for such purposes: Therefore

Be it enacted by the general assembly of the State of South Carolina:

SECTION 1. That the consent of the State of South Carolina be, and is hereby, given to the acquisition by the United States, by purchase, gift, or condemnation according to law, of such lands in the State as in the opinion of the Federal Government may be needed for the establishment of such national forest reserve in that region: *Provided,* That the State shall retain a concurrent jurisdiction with the United States in and over such lands so far that civil process in all cases, and such criminal process as may issue under the authority of the State against any person charged with the commission of any crime without or within said jurisdiction, may be executed thereon in like manner as if this act had not been passed.

SEC. 2. That power is hereby conferred upon Congress to pass such laws as it may deem necessary to the acquisition, as hereinbefore provided, for incorporation in said national forest reserve of such forest-covered land lying in the State as in the opinion of the Federal Government may be needed for this purpose.

SEC. 3. Power is hereby conferred upon Congress to pass such laws and to make and provide for the making of such rules and regulations, of both civil and criminal nature, and provide punishment for violation thereof, as in its judgment may be necessary for the management, control, and protection of such lands as may be from time to time acquired by the United States under the provisions of this act.

SEC. 4. That this act shall be in force from and after its ratification.

IS THIS APPALACHIAN-WHITE MOUNTAINS BILL CONSTITUTIONAL?

[Harvey N. Shepard.]

The Supreme Court of the United States gave a decision May 13, 1907, in a cause brought by the State of Kansas against the State of Colorado, which some people fear may affect the constitutional position of the pending bill for acquiring national forests in the southern Appalachian Mountains and White Mountains. The charge made by Kansas is that Colorado is depleting the flow of

water in the Arkansas River, a river which flows through both these States. The United States of America filed its petition of intervention; and alleged that within the watershed of the Arkansas River are 1,000,000 acres of public lands, uninhabitable and unsalable unless rendered so by the impounding of waters in this watershed to reclaim this land, that legislation of Congress has sanctioned the use of these waters in this arid region, and that under the reclamation act of June 17, 1902, \$1,000,000 have been expended in procuring sites for reservoirs and dams.

This contention brought directly to the court the question whether the amount of the flow of the waters of the Arkansas River is subject to the authority and control of the United States. The United States claimed that in and near the river, as it runs through Kansas and Colorado, are large tracts of arid lands; that the National Government itself is the owner of many thousands of acres; and that it has the right to make such legislative provision as in its judgment is needful for the reclamation of all these arid lands and for that purpose to appropriate the accessible waters.

This claim, says the Supreme Court, involves the question whether the reclamation of arid lands is one of the powers granted to the General Government. Certainly it is not; for, in the enumeration of the powers granted to Congress by the eighth section of the first article of the Constitution, we can not find one which by any implication refers to the reclamation of arid lands.

The pending bill authorizes the Secretary of Agriculture to acquire for national-forest purposes lands more valuable for the regulation of stream flow than for other purposes and situated on the watersheds of navigable streams. Herein is the sharp distinction from the Kansas-Colorado cause. In that cause the United States alleged that the Arkansas River is not navigable in the States of Colorado and Kansas. Here the only lands which can be acquired are those on the watersheds of navigable rivers; and it is for the protection of these navigable rivers that these forest areas are to be acquired.

No one questions the authority of the United States over navigable rivers. Congress may prevent or remove obstructions in these rivers, and it may take all needed measures to secure their uninterrupted navigability. What these measures shall be depends entirely upon the discretion of Congress, and there is no other authority whatever which can question them. Since the days of Chief Justice Marshall this has been the settled rule of construction.

It is conceded by all that the Government of the United States is one of limited powers and that it can wield only such attributes as are conferred upon it by the Constitution. These are expressed in the most general language; they do not descend to details, and they do not point out the means and methods by which the various powers are to be made operative.

Two schools of interpretation have existed among the statesmen and politicians of the country. The one has taught that a strict and close construction is to be placed upon all grants of power contained in the organic law, so as to limit the Government to those acts and means which absolutely are necessary to give force and operation to the grant. The other has maintained that the instrument is to be construed liberally, so as to enable the Government to adopt any means which would conduce fairly and reasonably to make the grant operative, and that among such means the Government has an unrestricted choice, which can not be limited by the courts. Those who thus read the Constitution assert that the powers of the Government are full, complete, and absolute within the range of the subjects committed to its care; that it may adopt whatever means it prefers which may tend to give effect to the general provisions of the fundamental law, and that among such means the selection is entirely a matter of policy and expediency.

The practice of the Government has been in accordance with the latter more liberal theory of construction. The Supreme Court of the United States has affirmed this view with the greatest emphasis and applied it to cases of the highest importance. The tribunals of most of the States have followed the lead of the national judiciary, although some of them have adopted the opposing theory and enforced it with great earnestness.

In *McCulloch v. Maryland* (4 Wheaton, 316), the Supreme Court says:

"It must have been the intention of those who gave these powers to insure, as far as human prudence could insure, their beneficial execution. This could not be done by confining the choice of means to such narrow limits as not to leave it in the power of Congress to adopt any which might be appropriate and which were conducive to the end. This provision is made in a Constitution intended to endure for ages to come, and consequently to be adapted to the

various crises of human affairs. To have prescribed the means by which government should, in all future time, execute its powers would have been to change entirely the character of the instrument and give it the properties of a legal code. It would have been an unwise attempt to provide, by immutable rules, for exigencies which, if foreseen at all, must have been seen dimly and which can be best provided for as they occur. To have declared that the best means shall not be used, but those alone without which the power given would be nugatory, would have been to deprive the legislature of the capacity to avail itself of experience, to exercise its reason, and to accommodate its legislation to circumstances.

"Take, for example, the power to establish post-offices and post-roads. This power is executed by the single act of making the establishment. But from this has been inferred the power and duty of carrying the mail along the post-road from one post-office to another. And, from this implied power, has again been inferred the right to punish those who steal letters from the post-office or rob the mail."

In *Kohl v. United States* (91 U. S., 367) the Supreme Court says:

"The powers vested by the Constitution in the General Government demand for their exercise the acquisition of lands in all the States. These are needed for forts, armories, and arsenals, for navy-yards and light-houses, for custom-houses, post-offices, and court-houses, and for other public uses.

"When the power to establish post-offices and to create courts within the States was conferred upon the Federal Government included in it was authority to obtain sites for such offices and for court-houses, and to obtain them by such means as were known and appropriate."

In *Cooley's Constitutional Limitations* it is said:

"So far as the General Government may deem it important to appropriate lands or other property for its own purposes, and to enable it to perform its functions—as must sometimes be necessary in the case of forts, light-houses, and military posts or roads, and other conveniences and necessities of government—the General Government may exercise the authority as well within the States as within the territory under its exclusive jurisdiction; and its right to do so may be supported by the same reasons which support the right in any case; that is to say, the absolute necessity that the means in the Government for performing its functions and perpetuating its existence should not be liable to be controlled or defeated by the want of consent of private parties or of any other authority."

As Congress has the power to declare war and to create and equip armies and navies, it has, the Supreme Court says in *United States v. Gettysburg Electric Railway Company* (160 U. S., 681), such other and implied powers as are necessary and appropriate for the purpose of carrying the powers expressly given into effect; and therefore it may take by right of eminent domain the land whereon was fought the battle of Gettysburg, because this "tends to enhance the respect and love of the citizen for the institutions of his country and to quicken and strengthen his motives to defend them."

The Constitution gives to the Government the power to regulate commerce. Under this grant Congress has enacted laws for the improvement of harbors, the construction of piers, the dredging of rivers, the erection of an Astronomical Observatory, and the conduct of a coast survey. It has invaded the common law by limiting the liability of carriers upon the oceans and the Great Lakes; and it has sent out expeditions to observe an eclipse and to explore the topography of the Dead Sea. Congress has full power to build or repair the levees of the Mississippi River and to maintain a bridge erected over a navigable stream running between several States; and if it may maintain, it also may cause to be erected. Indeed, it has exercised this authority several times by authorizing the construction of bridges over the Mississippi River.

Wilson v. Blackbird Creek Company (27 U. S., 245) is in relation to a dam which was built under State authority upon a creek into which the tide ebbed and flowed, and the question before the court was whether the dam had been built in violation of the power given in the Constitution of the United States to Congress to regulate commerce, and the Supreme Court of the United States decided in favor of the State upon the ground that Congress had not passed any act in execution of this power to regulate this creek, and intimates clearly that if Congress had passed such an act the State law authorizing a dam to be built across the creek would be void. It is clear that if Congress, under the power to regulate commerce, may prevent damming of the creek on the ground that such a dam would destroy the navigability of the stream, it also could authorize the building of a

dam in order to improve such navigability; and if it has this right, it certainly can have no less right to guard against destruction of a navigable river by protecting the headwaters and to insure a continual supply of water in the river by the preservation of the forest areas about these headwaters.

Mr. Justice Strong says in *South Carolina v. Georgia* (93 U. S., 4) "That the power to regulate commerce conferred by the Constitution upon Congress extends to the control of navigable rivers between States—rivers that are accessible from other States, at least to the extent of improving their navigability—has not been questioned during the argument, nor could it be with any show of reason. From an early period in the history of the Government it has been so understood and determined. The power to regulate commerce comprehends the control for that purpose, and to the extent necessary, of all the navigable rivers which are accessible in a State other than that in which they lie. For this purpose they are the public property of the nation and subject to all the requisite legislation by Congress. This includes the power to keep these open and free from any obstruction to their navigation interposed by the States or otherwise, to remove such obstructions where they exist, and to provide, by such sanctions as they deem proper against the recurrence of the evil and for the punishment of offenders."

In this case money was appropriated by Congress to improve Savannah Harbor by improving the navigability of the river, and to that end this dam was built. Would an appropriation to buy forest lands which protect and provide a continued water-storing area on the watersheds of the Connecticut, Merrimac, and other rivers be anything else than a direct and necessary means for the improvement of the navigability of these interstate streams?

In *Monongahela Co. v. United States* (148 U. S., 312) Congress passed an act to purchase the dam and locks of the plaintiff, or, in event of failure to purchase, to condemn and take over the property, and the right of the United States to dam the river, or to take over the dam already built, was not questioned.

As Congress has power under the Constitution to dredge navigable rivers, it would seem to follow, necessarily, that it has power to take such measures as will prevent the necessity of dredging. It is evident that the wasteful cutting of mountain slopes allows the soil to wash into the rivers, that navigation is threatened by the filling up of the channels, and that this can be prevented, to a large extent, by the reforestation of the mountain slopes. If so, then the means to be taken for this purpose, for example the purchase of lands on the watershed of these rivers, will be wholly within the discretion of Congress and not open to legal objection. A light-house is not an active part of the Government, but only an instrument which it uses under the power given it by the commerce clause of the Constitution. The holding of forest lands for the protection of the water supply of navigable rivers is an instrument also under this same clause of the Constitution.

The *Kansas-Colorado* case is not inconsistent with these principles. That case only decides that the reclamation of arid lands is not one of the powers granted to the General Government, and it was not claimed to be a means by which an express power was to be carried into execution. It was the very end sought for. The Supreme Court decides that this end is not legitimate; but it is careful not to say that if this reclamation were a means appropriate to a legitimate end then it would be unconstitutional.

[Copy of telegram sent by Governor Guild, of Massachusetts, to Harvey N. Shepard, chairman of the Massachusetts delegation.]

As chairman of the Massachusetts delegation, will you express my deep regret that the imperative duties of my busiest official season prevent my being present to express in person the strong interest of the Commonwealth in this measure.

Massachusetts has entered upon a broad and liberal forest policy. Unfortunately this State can not, under the best conditions, supply the lumber market of her own teeming population, nor can she protect the sources of her two greatest rivers, the Connecticut and the Merrimac, which have their headwaters in New Hampshire and to a considerable extent in the territory sought to be protected by this bill. On these rivers are some of the great industries upon which so much of the prosperity of Massachusetts depends, and on their upper courses, in New Hampshire and Vermont, are other great manufacturing plants in which Massachusetts capital is heavily invested. On both these rivers the navigation interests, though not extensive, are important and are likely to increase under the new transportation conditions.

The possibilities of long-distance electrical transmission of power are only beginning to be realized, and this gives an interstate value to water powers that were once of only local significance. The equable flow of these rivers is already affected unfavorably by the reckless cutting of the northern forests, which national control alone can prevent. As her material interests are largely involved and she is already doing what she can to protect and restore the forests within her own borders, Massachusetts asks and demands the support of the nation in protecting her interests where she has no control.

The Bay State, however, sends its representatives to this hearing to ask favorable consideration for this measure upon broader grounds than those of mere local self-interest. A large group of sister States, North and South, are equally or more concerned, and in their behalf, as well as her own, Massachusetts speaks. Industrially all New England is concerned in the perpetuation of forests on the great watersheds of northern New Hampshire and Maine, and every Southern State east of the Mississippi is vitally concerned in the future of the southern Appalachian forests, which protect the sources of the rivers flowing into the Atlantic, the Gulf, and the Mississippi, rivers many of them destined to play a large part in the industrial and transportation development of the near future and absolutely dependent for their usefulness upon the perpetuation of the forests upon their watersheds. Further than this, the great hardwood industries of the Central West depend for their material upon the Appalachian forests. Therefore, Massachusetts asks this legislation not as a local but as a national need.

The value of these regions for the health and recreation of millions of people in many States must not be overlooked. A healthy manhood and womanhood is the nation's greatest asset. The continued destruction of these forests without restoration will turn these mountains into wastes where no human being will care to live.

This work of preservation and utilization must be undertaken by the nation. There is no way by which the individual States can become landowners and exercise jurisdiction in other States; and if this difficulty could be overcome there is no practicable way by which a few of the States could maintain an adequate technical service, like the United States Forest Service, to administer the joint properties. An inner confederation of States, such as would be necessary, would be dangerous, repugnant, and unworkable. Furthermore, there is no justification for this avoidance of the manifest duty of the National Government.

West of the Mississippi are national forests, obtained by withdrawing from the market lands in which all of the citizens of the United States are joint owners. The benefits of this heavy investment, as well as of that for the national irrigation works, accrue directly to the newer States west of the Mississippi. We ask that similar protection, in the lesser degree which our less fortunate conditions permit, be extended to the Eastern States which place their dependence for stream flow and lumber supply upon the forested mountain ranges of the Appalachian system, which are fast being wasted at the cost of the people.

A RESOLUTION Favoring the establishment of a national forest reserve in the Southern Appalachian Mountain region.

Resolved by the House of Representatives, the Senate concurring: The general assembly of North Carolina hereby expresses its approval of the movement looking to the establishment by the Federal Government of an extensive national forest reserve in the Southern Appalachian Mountain region as a wise and beneficent measure, such as many other nations have already adopted, and which this country should adopt before it is too late, looking to the conservation of its forests and the protection of the sources of important streams; and

Whereas the proposal to establish this forest reserve has been approved and urged by the leading scientific societies and forestry associations of this country, and by the general press; and

Whereas this general assembly has passed an act granting its consent to the acquisition of lands in western North Carolina by the Federal Government for incorporation in such a forest reserve, believing the reserve to be one of great importance to the people of this State; and

Whereas a bill is now before the Federal Congress providing for the purchase of lands for this purpose:

Resolved, That the Senators and Representatives in Congress from this State are hereby requested to urge upon Congress the importance of prompt and favorable action in behalf of this measure.

In the general assembly read three times, and ratified this 18th day of January, A. D. 1901.

W. D. TURNER,
President of the Senate.

WALTER E. MOORE,
Speaker of the House of Representatives.

AN ACT To give consent by the State of North Carolina to the acquisition by the United States of such lands as may be needed for the establishment of a national forest reserve in said State.

Whereas it is proposed that the Federal Government purchase lands in the high mountain regions of western North Carolina and adjacent States for the purpose of establishing there a national forest reserve which will perpetuate these forests and forever preserve the headwaters of many important streams, and which will thus prove of great and permanent benefit to the people of this State; and whereas a bill has been introduced in the Federal Congress providing for the purchase of such lands for said purpose; therefore the general assembly of North Carolina do enact:

SEC. 1. That the consent of the general assembly of North Carolina be, and is hereby, given to the acquisition by the United States, by purchase or by condemnation, with adequate compensation except as hereinafter provided, of such lands in western North Carolina as in the opinion of the Federal Government may be needed for the establishment of such a national forest reserve in that region: *Provided*, That the State of North Carolina shall retain a concurrent jurisdiction with the United States in and over such lands so far that civil process in all cases and such criminal process as may issue under the authority of the State of North Carolina against any person charged with the commission of any crime without or within said jurisdiction may be executed thereon in like manner as if this act had not been passed.

SEC. 2. That power is hereby conferred upon Congress to pass such laws as it may deem necessary to the acquisition as hereinafter provided for incorporation in said national forest reserve such forest-covered lands lying in western North Carolina as in the opinion of the Federal Government may be needed for this purpose: *Provided*, That as much as 200 acres of any tract of land occupied as a home by bona fide residents in this State at the date of the ratification of this act shall be exempt from the provisions of this section.

SEC. 3. Power is hereby conferred upon Congress to pass such laws and to make or provide for the making of such rules and regulations of both civil and criminal nature, and provide punishment therefor, as in its judgment may be deemed necessary for the management, control, and protection of such lands as may be from time to time acquired by the United States under the provisions of this act.

SEC. 4. This act shall be in force from and after its ratification.

In the general assembly read three times, and ratified this the 18th day of January, A. D. 1901.

W. D. TURNER,
President of the Senate.

WALTER E. MOORE,
Speaker of the House of Representatives.

JOINT RESOLUTION requesting our Senators and Representatives to urge the passage of the bill now pending to secure the establishment of forest reserves in the southern Appalachians and White Mountains, and requesting Governor Glenn to attend meeting of governors in this interest.

Resolved by the Senate, the House of Representatives concurring, That our Senators and Representatives in Congress be requested to urge the passage of

the bills pending in the House of Representatives of the United States having for their object the establishment of forest reserves in the Southern Appalachians and White Mountains, and to use their best efforts to secure the passage of this bill, and that his excellency Governor R. B. Glenn be requested, if possible, to attend the meeting of governors of the several States to be held in the city of Washington in the interest of the passage of this bill.

In the general assembly read three times, and ratified this the 17th day of January, A. D. 1907.

STATE OF NORTH CAROLINA,
OFFICE OF SECRETARY OF STATE,
Raleigh, January 28, 1908.

I, J. Bryan Grimes, secretary of state of the State of North Carolina, do hereby certify the foregoing and attached four (4) sheets to be a true copy from the records of this office.

In witness whereof I have hereunto set my hand and affixed my official seal. Done in office at Raleigh this 28th day of January, in the year of our Lord 1908.

[SEAL.]

J. BRYAN GRIMES,
Secretary of State.

Resolutions on forest preservation adopted by the board of directors of the American Institute of Electrical Engineers, January 10, 1908.

Whereas the American Institute of Electrical Engineers recognizes that water powers are of great and rapidly increasing importance to the community at large, and particularly to the engineering interests of the country; and

Whereas the value of water powers is determined in great measure by regularity of flow of streams, which regularity is seriously impaired by the removal of forest cover at the headwaters with the resulting diminution in the natural storage capacity of the watersheds, this impairment frequently being permanent because of the impossibility of reforestation owing to the destruction of essential elements of the soil by fire and its loss by erosion; Therefore be it

Resolved, That it is the opinion of the American Institute of Electrical Engineers that the attention of the National and State governments should be called to the importance of taking such immediate action as may be necessary to protect the headwaters of important streams from deforestation and to secure through the introduction of scientific forestry and the elimination of forest fires the perpetuation of a timber supply; and be it further

Resolved, That the committee on forest preservation be instructed to communicate these resolutions to all Members of Congress and to the governors of all the States.

A true copy.

RALPH W. POPE, *Secretary*.

Copy of resolution.

Whereas the timber resources of this country are being rapidly diminished owing to unscientific methods of forestry, to the prevalence of forest fires and to a wasteful use of timber, resulting in a steady increase in the cost of both hard and soft woods, and which may result moreover in the diminution of the natural storage capacity of our streams, an increasing irregularity in the flow, and consequent impairment of the value of our water powers:

Resolved, That, in the opinion of the board of direction of the American Society of Civil Engineers, every endeavor should be made to further the introduction of principles of scientific forestry and the creation and preservation of National and State forest preserves, and in particular the board of direction approves and urges the passage by Congress of a bill providing for national forest reserves in the Appalachian and White mountains.

Organizations which have passed resolutions favoring the establishment of the Appalachian Forest Reserve.

Louisville Commercial Club, Louisville, Ky.
 Tennessee Board of Trade, Nashville, Tenn.
 Gadsden Commercial and Industrial Association, Gadsden, Ala.
 Business Men's Club, Huntsville, Ala.
 Mobile Commercial Club, Mobile, Ala.
 Greenville Board of Trade, Greenville, S. C.
 Belton Chamber of Commerce, Belton, S. C.
 Chamber of Commerce of Charleston, S. C.
 Atlanta Chamber of Commerce, Atlanta, Ga.
 Board of Trade of Nashville, Tenn.
 Board of Trade of Columbus, Ga.
 Charleston Board of Trade, Charleston, W. Va.
 Tennessee Board of Trade of the State of Tennessee.
 Gadsden Commercial and Industrial Association, Gadsden, Ala.
 Business Men's Club of Huntsville, Huntsville, Ala.
 Mobile Commercial Club, Mobile, Ala.
 Greenville Board of Trade, Greenville, S. C.
 Chamber of Commerce of Belton, Belton, S. C.
 Chamber of Commerce of Charleston, Charleston, S. C.
 Newberry Chamber of Commerce, Newberry, S. C.
 Atlanta Chamber of Commerce, Atlanta, Ga.
 Nashville Board of Trade, Nashville, Tenn.
 Atlanta Section of the American Institute of Electrical Engineers, Atlanta, Ga.
 Asheville Board of Trade, Asheville, N. C.
 West Virginia Board of Trade, Elkins, W. Va.
 Grand Rapids Board of Trade, Grand Rapids, Mich.
 Columbus Board of Trade (and others), Columbus, Ga.
 Savannah Board of Trade (and others), Savannah, Ga.
 La Crosse Board of Trade (and others), La Crosse, Wis.
 Winston-Salem Board of Trade (and others), Winston-Salem, N. C.
 Augusta Chamber of Commerce, Augusta, Ga.
 Chattanooga Chamber of Commerce, Chattanooga, Tenn.
 Cleveland Chamber of Commerce, Cleveland, Ohio.
 Chamber of Commerce (and others), Columbia, S. C.
 Chamber of Commerce and Industry (and others), Raleigh, N. C.
 Chamber of Commerce, Sumter, S. C.
 Commercial Club of Montgomery, Montgomery, Ala.
 Colorado Forestry Association, Denver, Colo.
 Connecticut Lumber Dealers' Association, Waterbury, Conn.
 California Promotion Committee (in convention at Petaluma).
 Engineering Society of the Carolinas.
 Federation of Women's Clubs (and others), Grand Rapids, Wis.
 Woman's Club of Paducah (and others), Paducah, Ky.
 Forestry Club of the University of Michigan, Ann Arbor, Mich.
 Greater Charlotte Club (and others), Charlotte, N. C.
 League of Improvement Societies in Rhode Island.
 Manufacturers' Club, High Point, N. C.
 Merchants' Association of New York, New York, N. Y.
 Merchants' and Manufacturers' Association of Milwaukee, Milwaukee, Wis.
 Rhode Island Chapter of the American Institute of Architects.
 Science Club of the University of Wisconsin, Madison, Wis.
 Women's Club (and others), Bay City, Mich.
 Women's Club (and others), Eau Claire, Wis.
 Adirondack Murray Memorial Association.

LOUISVILLE, KY., January 16, 1908.

JOHN H. FINNEY.

Secretary Appalachian National Forest Ass'n, Atlanta, Ga.:

Board of directors Louisville Commercial Club, representing over 3,000 members, on yesterday passed resolutions indorsing plans of your association. Please convey to mass meeting assurances of hearty interest of this the largest commercial organization in the South. Resolutions will be forwarded to Kentucky's Representatives in Congress.

R. S. BROWN, *President.*

Resolutions adopted by the National Board of Trade at the annual meeting held in Washington, January 21, 22, and 23, 1908.

Whereas the great natural resources are being dissipated for the purpose of present profit without regard to the future; and

Whereas the ordinary exercise of business methods and our duty to the generations of Americans who follow us demand that all natural resources should be protected and utilized consistent with the most intelligent methods; and

Whereas the continuation and development of foreign trade in manufactured goods depends largely on our ability to produce at the minimum of cost, it is therefore of vital importance that the waterways and water powers of the southern Appalachian and White Mountain regions, where hundreds of millions of dollars are now invested in manufacturing enterprises, shall be conserved and perpetuated by protecting the forest cover of these regions: Therefore, be it

Resolved, That the National Board of Trade commends the policy of the Administration in the preservation of the national forests and redemption of arid lands by irrigation and recommends the increase of forest ownership and control by establishing the proposed Appalachian and White Mountain Reserves, and recommends that the present session of Congress shall take favorable action thereon; we also especially recommend that measures for reforestation be urgently pushed forward. It is also

Further resolved, That the National Board of Trade, appreciating the importance and value of accurate information as to the timber resources of the United States, recommends that such information be acquired through the cooperation of the Census Bureau and the Forest Service, by the census of 1910.

Resolved further, That the National Board of Trade again urges upon Congress, as was done in the last message of the President to that body in relation to public lands, that they should, without further delay, pass the legislation necessary to carry into effect, fully and effectually, all the recommendations of the Public Lands Commission, as made in their report heretofore approved by the President and by him laid before Congress.

Respectfully submitted on behalf of the committee on forestry and irrigation.

WM. S. HARVEY,
Chairman, Philadelphia.

IBENEE DU PONT,
Wilmington, Del.

S. B. VROOMAN,
Philadelphia.

C. HENRY HATHAWAY,
Springfield, Mass.

Rivers which have their sources in the White Mountains, for each river showing distance navigable, annual tonnage according to latest statistics, total appropriations 1790 to 1907, average expenditure of Government money per mile, tonnage of commerce per mile according to latest statistics, and the tonnage (1905) for each dollar spent by the Government between 1790 and 1907 for improvements.

| Name of river. | Miles of navigable water. | Tons of freight carried in 1905. | Appropriations by the Government from 1790 to 1907 for improvements. | Total cost of improvements per mile of navigable water. | Average tonnage per mile of navigable water in 1905. | Average tonnage on river in 1905 for each dollar spent by the Government for improvements from 1790 to 1907. |
|-------------------|---------------------------|----------------------------------|--|---|--|--|
| Kennebec..... | 44 | 400,735 | \$667,445.71 | \$15,169.22 | 9,107.61 | 0.6004 |
| Androscoggin..... | 30 | | | | | |
| Saco..... | 6 | 48,537 | 346,775.00 | 69,835.00 | 9,707.50 | .139 |
| Merrimac..... | 17½ | 88,324 | 825,866.72 | 47,162.09 | 5,047.07 | .107 |
| Connecticut..... | 50 | 673,383 | 737,510.69 | 14,750.21 | 13,467.66 | .917 |
| Total..... | 146½ | 1,210,979 | 2,577,096.12 | 17,591.11 | 8,296.07 | .4609 |

Area of Northern New Hampshire land and water.

| | Acres. |
|---------------------------------|-----------|
| Virgin merchantable forest..... | 200,000 |
| Cut-over or culled land..... | 1,363,711 |
| Barren and waste land..... | 120,496 |
| Total forest land..... | 1,684,206 |
| Agricultural land..... | 244,036 |
| Water..... | 23,735 |
| Total..... | 1,951,977 |

From this it will be seen that virgin forest forms only about 12 per cent of the total forest area.

Approximate ownership of forest lands in Northern New Hampshire.

| | Acres. |
|--|-----------|
| Large lumber and pulp companies..... | 900,000 |
| Hotel companies..... | 28,000 |
| Small holders of forest land..... | 756,000 |
| Agricultural land, small holdings..... | 244,000 |
| Total..... | 1,028,000 |

A useful summary of the estimate and distribution of timber in northern New Hampshire is given, as follows:

Areas and yields of northern New Hampshire drainage basins.

| Class of land. | Saco. | Pemigewasset. | Ammonoosuc. | Upper Ammonoosuc and Israel. | Androscoggin. | Magalloway. | Upper Connecticut. | Total. |
|---|---------------|----------------|---------------|------------------------------|---------------|---------------|--------------------|----------------|
| Softwoods: | | | | | | | | |
| Under 5,000 board feet per acre..... | Acres. 47,025 | Acres. 124,451 | Acres. 83,240 | Acres. 87,446 | Acres. 95,562 | Acres. 69,000 | Acres. 154,920 | Acres. 611,641 |
| 5,000 to 10,000 board feet per acre..... | 47,931 | 36,430 | 20,596 | 24,717 | 36,129 | 36,320 | 42,880 | 295,006 |
| Over 10,000 board feet per acre..... | 5,786 | 30,274 | 4,004 | 2,571 | 5,673 | 25,360 | 9,280 | 82,948 |
| Pine..... | 32,216 | 256 | | 520 | 720 | | 1,040 | 34,752 |
| Hardwoods: | | | | | | | | |
| Under 15 cords per acre..... | 39,067 | 17,880 | 14,423 | 10,987 | 68,077 | 800 | 10,440 | 162,585 |
| Over 15 cords per acre..... | 154,448 | 51,712 | 16,633 | 31,115 | 38,619 | | | 292,527 |
| Agricultural land..... | 44,409 | 40,422 | 29,571 | 16,356 | 24,679 | 1,320 | 87,280 | 244,036 |
| Burns, 1903..... | 11,668 | 6,351 | 13,831 | 36,221 | 10,314 | 200 | 5,680 | 84,255 |
| Waste land..... | 53,581 | 33,452 | 8,972 | 7,914 | 5,368 | 1,120 | 4,080 | 114,517 |
| Barren land..... | 1,420 | 717 | 1,264 | 585 | 1,992 | | | 5,978 |
| Water..... | 6,804 | 1,561 | | 2,040 | 6,280 | 1,840 | 5,120 | 23,735 |
| Total..... | 444,435 | 343,512 | 142,539 | 220,499 | 344,312 | 135,960 | 320,720 | 1,951,977 |
| Yield of soft woods (million board feet)..... | 546 | 1,007 | 285 | 402 | 928 | 816 | 780 | 4,764 |

From the above it appears that the agricultural land is little more than one-tenth of the area; that nearly 150,000 acres are in waste or barren condition or covered with water; that 84,255 acres burned over in one year—1903; that the softwood area is five times greater than the hardwood area, and that the stand of softwood is estimated a 4,764,000,000 feet board measure.

Stumpage and log values by States: 1905 and 1900.

[Value per M board feet.]

| State. | Standing timber. | | | Saw logs. | | |
|---|------------------|--------|--------------------|-----------|--------|--------------------|
| | 1905. | 1900. | Per cent increase. | 1905. | 1900. | Per cent increase. |
| Maine..... | \$3.70 | \$2.52 | 46.8 | \$9.66 | \$8.15 | 18.5 |
| New Hampshire..... | 4.28 | 2.68 | 59.7 | 8.79 | 6.96 | 26.3 |
| Vermont..... | 3.93 | 2.09 | 88 | 10.00 | 5.80 | 70.6 |
| Massachusetts..... | 4.19 | 2.67 | 56.9 | 8.94 | 9.49 | * 6 |
| Rhode Island..... | 4.12 | 3.02 | 36.7 | 6.86 | 7.15 | * 19.6 |
| Connecticut..... | 4.15 | 2.90 | 43.1 | 9.32 | 7.88 | 18.3 |
| Average in New England..... | 4.06 | 2.65 | 53.4 | 8.93 | 7.57 | 18.9 |
| Average in four Middle Atlantic States ^a | 4.30 | 3.38 | 30 | 9.70 | 6.89 | 40.3 |
| Average in three Lake States ^c | 4.19 | 3.36 | 24.7 | 9.94 | 7.63 | 30.3 |
| Average in three Pacific States ^d | 1.14 | .87 | 30.5 | 6.20 | 4.74 | 30.3 |
| Average in eight Southern States ^e | 2.74 | 1.94 | 41.2 | 7.87 | 6.04 | 30.3 |
| Average United States..... | 2.50 | 2.18 | 15.6 | 7.51 | 6.23 | 19.6 |

^a Decrease.^b New York, New Jersey, Pennsylvania, Delaware.^c Michigan, Wisconsin, Minnesota.^d Washington, Oregon, California.^e Maryland, Virginia, West Virginia, North and South Carolina, Georgia, Kentucky, Tennessee.

The per cent of rise in price of standing timber during these five years has been greatest in Vermont (88 per cent), where the price in 1900 was the lowest in New England. The next highest percentages are in New Hampshire (59.7 per cent) and Massachusetts (56.9 per cent). The average per cent of rise in New England (53.4 per cent) is greater than in any of the other groups of States, although in the southern Appalachian States it is very large (41.2 per cent), and between three and four times as large as the average for the entire country (15.6 per cent).

WHAT ARE THE CAUSES OF THIS WIDESPREAD ADVANCE IN THE PRICE OF TIMBER, AND PARTICULARLY IN THE WHITE MOUNTAINS?

The causes are both general and local and include the following:

In those States that formerly led all others in the production of lumber the supply is either exhausted and there are practically no sawlogs available for the mills, as in Ohio, Indiana, and Illinois, or the annual cut has become relatively much less important, as in New York, Pennsylvania, and the Lake States. Put in graphic form, these changes in the rank of the States which produce large quantities of lumber are indicated in this table:

Relative rank of the eight States leading in the production of lumber since 1850.

| 1850. | 1860. | 1870. | 1880. | 1890. | 1900. | 1904. | 1905. |
|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-------|
| N. Y..... | Pa..... | Mich..... | Mich..... | Mich..... | Wis..... | Wis..... | Wash. |
| Pa..... | N. Y..... | Pa..... | Pa..... | Wis..... | Mich..... | Wash..... | Wis. |
| Me..... | Mich..... | N. Y..... | Wis..... | Pa..... | Minn..... | Mich..... | La. |
| Ohio..... | Me..... | Wis..... | N. Y..... | Minn..... | Pa..... | La..... | Minn. |
| Ind..... | Ohio..... | Ind..... | Ind..... | Ind..... | Wash..... | Pa..... | Mich. |
| Mich..... | Ind..... | Me..... | Ohio..... | Wash..... | Ark..... | Minn..... | Pa. |
| Mass..... | Wis..... | Ohio..... | Me..... | N. Y..... | Ohio..... | Ark..... | Ark. |
| Ill..... | Cal..... | Mo..... | Minn..... | Ohio..... | Ind..... | Miss..... | Miss. |

There has been a general realignment of States, due to partial exhaustion in the older States. New York, which led in the cut of 1850, disappeared from the table of the eight leading States in 1900. Pennsylvania, which was first in 1860, fell to seventh in 1905, a period of twenty-five years. Michigan, which held sixth place, advanced to first for two decades, and has now declined to fifth (1905). Michigan and Wisconsin, which held the lead for forty years,

have now been surpassed by Washington. How long will the supply of the Pacific States meet the now enormous and ever-growing demand? Nearly all of the States in the above lists are primarily agricultural, and the land is used in farming after the forests are cut. But in the mountain regions of the Appalachian system agriculture is necessarily restricted and a forest crop returns. The demand of the country has partly turned back upon these mountain regions, and in New England, where the population is dense and the market excellent, the advance has been sharpest. The purchase of extensive tracts for future use by large companies has further restricted the supply, particularly in New Hampshire. It is to this nonagricultural and natural forest land to which the country must turn more and more in future. Thirty-seven per cent of the State of New Hampshire, or about 3,300 square miles, has never been cleared for farms, besides nearly 3,000 additional square miles (1,760,000 acres) that were taxed as improved lands in 1850, but have reverted to unimproved lands in 1900.^a

GROWTH OF THE PAPER AND PULP BUSINESS.

The phenomenal growth in the manufacture of paper from spruce pulp is indicated in the following table. The figures for 1890 are included for New Hampshire in order to show the development from small beginnings during fifteen years. In other States the growth has been similar.

The paper and pulp industry in New England.

[A table compiled from the United States Census.]

| State. | Year. | Number of mills. | Average number wage-earners. | Total wages. | Total capital. | Value of product. |
|--------------------|-------|------------------|------------------------------|--------------|----------------|-------------------|
| New Hampshire..... | 1890 | 15 | 520 | \$220,122 | \$1,221,491 | \$1,282,022 |
| | 1900 | 19 | 2,391 | 1,086,856 | 8,163,061 | 7,244,733 |
| Maine..... | 1905 | 25 | 2,522 | 1,315,310 | 14,041,014 | 8,990,291 |
| | 1900 | 35 | 4,851 | 2,162,972 | 17,473,160 | 13,223,275 |
| | 1905 | 37 | 7,574 | 4,052,919 | 41,273,015 | 22,971,124 |
| Vermont..... | 1900 | 27 | 1,216 | 571,018 | 4,853,906 | 3,384,773 |
| | 1905 | 28 | 1,280 | 616,735 | 5,628,676 | 3,831,448 |
| Massachusetts..... | 1900 | 93 | 9,061 | 3,988,400 | 26,692,022 | 22,141,461 |
| | 1905 | 87 | 17,705 | 5,587,892 | 41,073,769 | 32,012,247 |
| Connecticut..... | 1900 | 49 | 1,425 | 633,413 | 3,968,152 | 3,565,021 |
| | 1905 | 50 | 1,750 | 843,333 | 5,892,682 | 6,639,147 |
| Totals..... | 1900 | 223 | 18,944 | 8,342,659 | 60,931,121 | 49,559,268 |
| | 1905 | 227 | 30,831 | 12,416,159 | 107,910,058 | 73,364,259 |

Mills cutting spruce, 1905.

| State. | Number sawmills. | Amount cut (1,000 board feet). |
|--------------------|------------------|--------------------------------|
| Maine..... | 239 | 358,758 |
| New Hampshire..... | 111 | 59,710 |
| Vermont..... | 244 | 111,650 |
| Massachusetts..... | 39 | 31,960 |
| Total..... | 633 | 562,098 |

The mills are located chiefly in northern New England, where spruce grows. Aside from the large local demands the product is shipped largely to Boston and thence redistributed. A considerable quantity goes directly to Lowell, Worcester, and other New England cities. From Boston there is a coast-wise trade to New York, to southern ports, and to South America and West Indies. As shown by a previous table, the average value of saw logs per thousand feet in New England is \$8.93. The approximate value of the raw material at the mills, therefore, is \$4,998,935, or about \$5,000,000. On

^a Twelfth Census bulletin, New Hampshire.

the market, at an average price of \$25 per thousand board feet, the product would be valued at \$14,052,450. The preservation of this industry also depends upon the care with which the supplies in the northern forests are protected.

Cut of spruce, 1905, and distribution of spruce used for pulp.

| State. | Cut
(M board
feet). | Per
cent of
total. | Number
compa-
nies
making
pulp. | Companies
getting
supplies
from other
States or
Canada. | Amount
used in
making
pulp
(M board
feet). ^a | Per
cent
of
total. | Esti-
mated
length
of sup-
ply
(years). |
|------------------------|---------------------------|--------------------------|---|--|--|-----------------------------|--|
| Maine..... | 858,758 | 30.7 | 18 | 2 | 286,747 | 16.0 | 15.0 |
| New Hampshire..... | 59,710 | 5.1 | 6 | 2 | 138,485 | 7.4 | 28.0 |
| Vermont..... | 111,650 | 9.6 | 7 | 2 | 12,983 | .7 | 30.0 |
| Massachusetts..... | 31,980 | 2.8 | 4 | 3 | 19,636 | 1.7 | 25.0 |
| Total New England..... | 562,098 | 48.2 | 35 | 9 | 452,850 | 25.2 | 24.2 |
| New York..... | 211,076 | 18.1 | 60 | 21 | 748,992 | 41.6 | 19.0 |
| Pennsylvania..... | (c) | | 11 | 7 | 148,329 | 8.0 | 15.0 |
| Virginia..... | (c) | | 3 | 2 | 39,166 | 2.0 | 15.0 |
| West Virginia..... | 107,072 | 9.2 | 4 | | 55,161 | 3.0 | 23.0 |
| Ohio..... | (c) | | 3 | 3 | 30,857 | 1.7 | |
| Michigan..... | (c) | | 8 | 3 | 62,721 | 3.3 | 20.0 |
| Wisconsin..... | (c) | | 30 | 20 | 218,553 | 12.2 | 13.0 |
| Minnesota..... | (c) | | 3 | | 19,315 | 1.0 | |
| All other..... | 285,694 | 22.8 | 7 | | 47,621 | 2.0 | 30.0 |
| Total..... | 1,165,940 | 100.0 | 164 | | 1,713,565 | 100.0 | 21.0 |

^a On the basis that 1,000 board feet equal 1½ cords.

^b Average.

^c Included in "All others" below.

Importations from Canada.

| | | |
|---|-------------------|---------|
| 1899 | M board feet..... | 199,476 |
| 1905 | do..... | 353,739 |
| Increase | per cent..... | 82.9 |
| Per cent of total cut in United States, 1907..... | | 30.3 |

Summary.

1. The White Mountain region is natural forest land, having a supply of spruce likely to last twenty-five years and an excellent stand of hard woods now held practically at the price of cord wood.

2. As the timber scarcity grows in other parts of the country the cut in the White Mountains is heavier and the prices are advancing.

3. The present methods of cutting the steep slopes are not favorable to a future crop, and when followed by fire, which is usual, the recurrence of a valuable forest growth is postponed from one to three centuries. In many places the soil is rendered barren.

4. The product of the mountain forests is distributed throughout the country, especially in the form of news paper. Paper mills using pulp made from mountain spruce are found in all of the New England States.

5. The preservation of these mountain forests for their best future use does not concern chiefly the State in which they stand nor those immediately adjoining. Those States having the timber supply will be the last to suffer. The pinch comes first and hardest upon the other States.

HARVARD UNIVERSITY, DIVISION OF FORESTRY,
Cambridge, Mass., January 22, 1908.

To the COMMITTEE ON AGRICULTURE, HOUSE OF REPRESENTATIVES.

GENTLEMEN: The division of forestry of Harvard University begs to lay before the Committee on Agriculture certain considerations bearing upon the bill for acquiring national forests in the southern Appalachian and White Mountains.

The question before Congress regarding this bill is, of course, whether the project contemplated is an essential to the interest of the nation as other measures for which the same money might be appropriated. We do not attempt to answer this question, but in order to assist the committee in answering it we should like to call to your attention some of the effects of the passage of this measure. These consist:

First, of the beneficial effects to be expected if the project is undertaken.

Second, of the harmful ones to be expected if it is not.

The beneficial effects consist of the conservation of two natural resources—timber and water. Forests may be classed as either productive or protective. Those on steep slopes are essentially protective. Forest management consists of three chief processes:

First, to locate and limit productive and protective areas.

Second, to grow on productive areas the maximum amount of timber per annum.

Third, to preserve both classes of forest from fire and other injuries. Such management, carried on by trained forest and hydrographic engineers, would, as investigations show, probably make it possible for the forest area of the country to supply ultimately the timber demand, and water flow could be regulated as far as is within man's power.

Forest management on a large scale has been established by Congress in the West. We believe that if Congress would establish the same thing in the East, where two-thirds of our population are living, the cooperation of the States and of individuals would follow. The project would be, like the Navy, an insurance, but, unlike the Navy, would be self-supporting. What results may be expected from such a policy can be judged from those already attained both in Europe and upon our own national forests.

The harmful effects to be expected if the project is not undertaken consist of the dissipation of timber, water, and the land surface.

The land will remain in the hands of individuals who usually can not afford to conserve these resources, and the results to be expected from such lack of management may be judged by the experience of Europe, of China, and in our own Appalachian forests. These results may be considered according to their effect upon timber, water, and the land surface.

As to timber, investigations made by the Forest Service show that the annual growth of our forest area is not more than two-fifths of our annual consumption. This condition is due to the inefficiency of present methods.

Investigations show also that at the present rate of consumption the total timber supply of the country will be exhausted in less than thirty-three years and the hardwood supply within sixteen years. It is probable, moreover, that the rate of consumption will increase. The deficiency will not be met by any substitutes for wood.

Although other materials will take and have taken the place of wood, yet in spite of or because of this the demand for wood has increased.

When our timber supply has been exhausted, Canada and other countries will be guarding their forests for their own use, and slight relief may be expected from importation.

The period of want thus characterized will continue until relieved by the results of forest management. In the meantime the period is already foreshadowed in the doubling of lumber prices and the closing of wooden-ware establishments.

As to water, it is well known that the tendency of streams to become alternately high and low is intensified by clearing the forest cover on the mountain slopes, turning the high waters into floods and the low water into dry streams. Forest cover affects water flow by providing a porous ground cover and by retarding the annual melting of snow.

This melting in the forest takes place gradually during a period of several weeks. When not protected by such cover it happens within a few days or even hours. While protective forests can not wholly prevent floods, they can check them. The present methods make no attempt to check floods, but instead they increase them by clearing the steep slopes.

As regards water, there are, then, two chief results of present methods: First, to lose a large proportion of the 3,300,000 horsepower which the Appalachian area can produce; second, to pay \$100,000,000 a year for the privilege of having catastrophes like the Pittsburg flood.

As to the land surface, this, too, is dissipated either by mutilation or by permanent destruction. This takes place through two agencies—fire and floods.

Fire, beside burning each year many millions of feet of timber, does a far greater harm by injuring or destroying the forest soil, rendering it of little or no use either for productive or protective purposes.

Beside direct damage, floods do an indirect and irreparable damage to forest and arable soils, not by destroying, but by removing them. It was estimated twelve years ago that within the southern Appalachian region the fertile stratum of soil had been removed from an area of 3,000 square miles, and that such removal was continuing at the rate of 100 square miles each year. In short, the useful area of the country—by fire and floods—is being permanently reduced. Only under proper methods of logging and by a system of fire protection can such reduction be impeded.

The soil is not only lost where it is needed, but found again where it is not needed, namely, in the channels of navigable rivers, from which it is removed at enormous expense by the Government. Thus the present lack of management has the economical result of converting a national resource into a national expenditure.

We have considered above the benefit to be obtained and the harm to be prevented by undertaking the present project. If the Government does not act, this means that it elects to leave the conservation of the resources in the hands of individuals who are not in the position to conserve them. But if the project is one which should at some time be undertaken, then the next question is whether it should be commenced immediately; that is, whether the ends to be accomplished tend to be defeated by delay? Let us consider the effects of delay upon the resources—timber, water, and land.

The timber demanded yearly by the country can not be permanently supplied by the forest area thereof until a forest crop raised under proper management has had time to grow. This would take from forty to one hundred years. If forest management on a large scale were started to-day, the future period of want could not even then be averted. We can only hope to make it as short as possible. Delay in starting such management means delay in the reaping of its results, and this means the lengthening of the period of want.

The regulation of water flow might be effected in part by systems of dams and reservoirs, but the effect of such systems is insufficient in comparison with the huge natural sponge of the forest cover; and the cost of protecting the latter is insignificant as compared with that of constructing the former.

Each flood, by its erosion, paves the way literally for the next; floods breed floods, which in turn breed empty rivers. The injury is not only permanent but accelerative. Delay in protecting the slopes means delay in checking the spread of the flood influence.

The land area destroyed by erosion and fire forms an unique species of desert. Natural reclamation of such deserts may take place, if not interrupted by fire, within centuries rather than decades. Artificial reclamation can sometimes be partially achieved within decades rather than years; burned soil can be reclaimed artificially for protective purposes only, but not for productive ones. Artificial protection, where it can be applied at all, consists of dams, reservoirs, and wattle works—feeble and expensive substitutes for the forest.

France, among other nations, has forced such means upon herself, spending for cure several times the cost of prevention. It is too late for us now to profit wholly by this experience, but we still have the chance to obtain a portion of that profit. Immediate protection of the land from fire and "skinning" is all that can check the further spread of devastation. Delay in this protection means the outlay of money and the acquisition of a desert.

If the project contemplated by this bill ought to be undertaken, and immediately undertaken, the next question is whether the nation should act or the 11 Appalachian States enumerated in the bill. The interest of the 11 States in the matter is of course vital, but no more so than that of the nation.

The area would be drawn upon for timber of all kinds by the Eastern States, and for hard-wood timber by the entire country. The water flow in 22 States is directly influenced by the area. The indirect influence of this water flow on the industries of the whole country need only be mentioned. It is, moreover, probable that the efficiency of one management would be greater than that of eleven new and separate managements. The purchase of the whole area by the 11 States would amount to a gift by them to the rest of the country, one, to be sure, in which the donors would have a share; but can these States be expected to appropriate money to aid a nation that refuses to aid itself?

It seems to us that these considerations will help to decide the question as to the value of the ends to be accomplished by this bill, and also the question whether such ends tend to be defeated by delay.

If the Government can not afford to appropriate money for the purposes given, it is because that money is needed for more essential purposes. Are the ends sought by any alternative measures more essential at this time than those sought by the Appalachian bill?

Respectfully submitted.

RICHARD T. FISHER, *Chairman.*

PROVIDENCE, R. I., January 27, 1908.

HENRY A. BARKER,
Vice-President American Civic Association.

DEAR SIR: I have been notified that the Committee on Agriculture of the House of Representatives is to give a hearing January 30 upon the proposed bill for national forests in the White Mountains of New Hampshire and the Appalachians in the South. I am informed that it is your intention to be present at that hearing as a representative of the American Civic Association.

I should be glad to have you also represent the city of Providence, and hereby request you to urge in its behalf the adoption of this very important measure. The city of Providence feels a very strong interest in the White Mountain forest. Although this, the second city of New England, is not located on any stream flowing from the White Mountains, and its great industries are not dependent upon those rivers, it is greatly interested in the prosperity of the neighboring States, which furnish a rich market for its wholesale and retail trade, and for which it is the natural distributing point for a great variety of things, particularly southern products.

The number of Rhode Island people who make summer homes in the White Mountains and own property in that region is very large. The White Mountains are almost in the dooryard of our city and are most valuable as a health and pleasure resort. The rising price of lumber affects not only the New England product, but all that which comes to the city from the South, and this brings much hardship to builders and to rent payers, and greatly restricts building operations.

Rhode Island has adopted a liberal and wise policy regarding its own woodlands, and will not petition Congress so far as they are concerned, but Providence and Rhode Island are quite unable to take action or to protect their interests in the White Mountain region except through the aid of the National Government.

Respectfully, yours,

PATRICK J. MCCARTHY, *Mayor.*

Resolution unanimously adopted at national convention of the American Civic Association at Providence November 21, 1907.

APPALACHIAN NATIONAL FORESTS.

In approval of the proposed national forests in the Appalachian ranges, the association adopted this resolution, proposed by Edwin A. Start, secretary of the Massachusetts Forestry Association:

Whereas the timber supply of the United States is approaching exhaustion and already the pinch of scarcity is felt, and the people of the United States now hold more than 150,000,000 acres of national forests west of the Mississippi River, insuring to the West a moderate local timber supply for the future; and

Whereas the States east of the Mississippi River must depend for their local timber supply upon the forests, existing or restored, upon the Appalachian ranges, which are now being rapidly destroyed for private gain, assuring in the near future a disastrous timber famine; and

Whereas these Appalachian forests conserve and equalize the supply and flow of water in the lakes and rivers of the Atlantic coast, Mississippi and Gulf systems, upon which great populations and great industries depend: Be it

Resolved, That the American Civic Association emphatically approves of the project of creating national forests in the Appalachian ranges, north and south, and urge the members of both Houses of Congress, irrespective of party, to work and vote for this measure.

Resolutions passed by the Providence Board of Trade.

Resolved that the Providence Board of Trade heartily supports the action of the National Board of Trade in its approval of the project for national forests in the White Mountains and in the Southern Appalachians.

A wise conservation of the forests of the East, which contain the principal supply of hard wood remaining in America, appears possible only by Government control; a timber famine that must of necessity restrict building operations and add greatly to all rents and therefore to the cost of living, is already making itself felt throughout the nation. The mountain forests in these two regions govern the stream flow of most of the Eastern States, and we are convinced that their continued destruction involves devastating floods, alternating with droughts of increasing severity that will have a most injurious effect on navigation of rivers, upon vast industries now dependent on water power, and upon the climate and on agricultural productiveness.

The summer attractions of the beautiful White Mountain country are of benefit and enjoyment annually to thousands of Rhode Islanders, and many citizens of Rhode Island own property that will be very injuriously affected by the continued destruction of these attractions. The lumber supply of New England demands the cultivation of the forests for a permanent crop instead of their despoiling by wasteful and destructive methods.

The greatest prosperity of Providence demands that the States of New England shall not be stripped of their natural wealth and resources in ways now threatened, yet the destructive influences now at work are all located in States beyond our own, and relief may be obtained only by action of the National Government: Therefore be it

Resolved, That this board earnestly requests our National Congress to enact the legislation necessary to secure these national forests in the East; and further be it

Resolved, That the members of the Rhode Island delegation in Congress be, and are hereby, respectfully urged to lend their assistance toward the carrying out of this important project.

GEO. H. WEBB, *Secretary*.

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS,
Providence, January 29, 1908.

Mr. HENRY A. BAKER,
*Secretary, Metropolitan Park Commission,
52 Custom House street, City.*

DEAR SIR: Owing to the large amount of work which his excellency has had during the past several days in connection with the session of the legislature, it has been impossible to reach your communication until to-day. The governor is most thankful to you for your deep interest in the matter which is to come before the Congressional committee at Washington in a few days and for your hearty invitation to him to be present. He regrets that on account of the numerous matters requiring his attention in the State just at present it will be impossible for him to get away, although he is in hearty sympathy with this great movement and it would afford him extreme pleasure were circumstances such as to permit him to go to Washington.

He sincerely trusts that the hearing at Washington will be fruitful.

Very respectfully, yours,

JOSEPH V. BRODERICK,
Executive Secretary.

STATE OF VERMONT, EXECUTIVE DEPARTMENT,
Proctor, Vt., January 24, 1908.

Mr. PHILIP W. AYRES,
Concord, N. H.

DEAR SIR: Please excuse delay in answering yours of the 16th. I have realized the importance of this work and should be glad to attend this meeting personally, but I have had an engagement in Boston for January 30 for a long time which I can not possibly cancel or change. Have been trying very hard to get our Lieutenant Governor Prouty, of Newport, to attend this meeting, had hoped until to-day that he might be able to do so, but he now tells me that he can not. I am trying some other people in the State to induce them to attend. We have no appropriation covering the expense of this work and therefore whoever goes would have to bear their own expenses, which is something of a hindrance in securing people to go. I shall, however, keep at it and endeavor to get some one to attend the meeting if possible.

Very truly, yours,

FLETCHER D. PROCTOR.

RESOLUTIONS AND PETITIONS FOR APPALACHIAN-WHITE MOUNTAIN BILL.

Resolutions adopted by the American Civic Association, December, 1907.

Whereas the timber supply of the United States is approaching exhaustion and already the pinch of scarcity is felt, and the people of the United States now hold more than 150,000,000 acres of national forests west of the Mississippi River, insuring to the West a moderate local timber supply for the future; and

Whereas the States east of the Mississippi must depend for their local timber supply upon the forests, existing or restored, upon the Appalachian ranges, which are now being rapidly destroyed for private gain, assuring in the near future a disastrous timber famine; and

Whereas these Appalachian forests conserve and equalize the supply and flow of water in the lakes and rivers of the Atlantic coast, Mississippi, and Gulf systems, upon which great populations and great industries depend: Be it

Resolved, That the American Civic Association emphatically approves of the project of creating national forests in the Appalachian ranges, north and south, and urges the Members of both Houses of Congress, irrespective of party, to work and vote for this measure.

Resolutions adopted by the American Cotton Manufacturers' Association at its annual meeting in Philadelphia, May 16, 1907.

Whereas the success of cotton manufacturing is largely dependent upon cheap power; and

Whereas with progressive improvements in transmission facilities electric power generated by waterfalls is already much the cheapest and best known and is yearly becoming more important; and

Whereas electric power is dependent upon regular stream flow which, in turn, depends upon the presence of forests at the sources of streams; and

Whereas the forests at the sources of the streams which furnish power to the cotton manufacturing industry of America, namely, in the southern Appalachian and White mountains, are being rapidly destroyed; and

Whereas this forest destruction is already resulting in floods and droughts, in the silting up of streams, and in the washing away of dams and mills, \$18,000,000 having been destroyed in a single year, with the evil but begun; and

Whereas under present policies, as Old World experience eloquently testifies, irreparable ruin will, in a few more years, have been wrought not only to the cotton industry but to a multitude of other vast interests, public and private; and

Whereas the sole remedy lies in the establishment of national forest reserves in the southern Appalachian and White mountains: Therefore, be it

Resolved, That we again earnestly urge the immediate establishment of such reserves.

Resolved, That we commend the efforts already made and almost successful and those now being made to accomplish this end; that, as heretofore, we hereby again pledge ourselves, individually and collectively, to this effort, and that we appeal to all concerned, whether as business men simply, as citizens, or as both, to employ every honorable means to insure the establishment of these reserves by the National Congress at its next session.

Resolutions adopted by the American Forestry Association at its annual meeting in Washington, January 9, 1907.

Whereas the bill for national forest reserves in the southern Appalachian and White Mountain regions has passed the United States Senate without dissent, has been unanimously reported to the House of Representatives from the Committee on Agriculture, and its passage has been repeatedly urged by the President in messages to Congress; and

Whereas if the bill does not pass at the present session of Congress time will elapse in which denudation will continue unchecked, with irreparable damage to the water powers and to the timber and agricultural interests of the country, both North and South; and

Whereas the price of land and timber is so rapidly increasing that action can not again be so effective as now: Therefore

Resolved, That the American Forestry Association instruct its executive committee to appoint a suitable delegation to present the above facts to the honorable Speaker of the House of Representatives, in order that this measure may come before the House for action at the present session.

Resolved also, That each member of the association present in Washington is requested to confer with his Representative to the same end and that each member of the association throughout the country is requested to write promptly to his Representative, asking him not only to vote for this measure if it comes up, but also to see that it does not fail to come up for action at this session of Congress.

At the same meeting the following resolutions were also adopted:

Whereas, the welfare of all the people is injuriously affected by the increasing scarcity and cost of wood materials, and much of their savings throughout the country are invested in various enterprises dependent on water powers which would be ruined by the destruction of the forests;

Resolved, That this association warns investors, irrespective of locality, of the danger of loss on their investments unless the Government safeguards forest conditions.

Resolutions adopted by the board of directors of the American Institute of Electrical Engineers, January 10, 1908.

Whereas, the American Institute of Electrical Engineers recognizes that water powers are of great and rapidly increasing importance to the community at large, and particularly to the engineering interests of the country; and

Whereas, the value of water powers is determined in great measure by regularity of flow of streams, which regularity is seriously impaired by the removal of forest cover at the headwaters, with the resulting diminution in the natural storage capacity of the watersheds, this impairment frequently being permanent because of the impossibility of reforestation, owing to the destruction of essential elements of the soil by fire and its loss by erosion: Therefore be it

Resolved, That it is the opinion of the American Institute of Electrical Engineers that the attention of the National and State governments should be called to the importance of taking such immediate action as may be necessary to protect the headwaters of important streams from deforestation and to secure through the introduction of scientific forestry and the elimination of forest fires the perpetuation of a timber supply; and further be it

Resolved, That the committee on forest preservation be instructed to communicate these resolutions to all Members of Congress and to the governors of all the States.

Resolutions adopted by the American Mutual Newspapers' Association at its meeting in May, 1907, and also by the National Association of Manufacturers at its twelfth annual convention in New York City, May 21, 1907.

Whereas an adequate supply of wood and timber is necessary for the permanence and prosperity of many of our most important industries; and

Whereas the country as a whole consumes every year between three and four times more wood than all the forests of the United States grow in the meantime, and it is estimated that the entire commercial supply of wood and timber in this country will not last over twenty-five years, unless systematically conserved and replenished; and

Whereas deforestation menaces the river valleys with increasing danger from destructive floods, and steadily lessens and renders more irregular the flow of streams used for irrigation and water power; and

Whereas the repeal of the timber and stone act has been repeatedly urged upon Congress by the President in his message to Congress, and by the Secretary of the Interior, as well as in the report of the Public Lands Commission: Therefore be it

Resolved, 1. That the timber and stone act shall be repealed, and that all public timber lands shall be included in permanent forest reserves, the title to the land to be forever retained by the National Government, stumpage only of matured timber to be sold, and young timber to be preserved for future cutting, so that the forests will be perpetuated by right use; and that the National Gov-

ernment shall, by the reservation of purchase of existing forest lands, and the planting of new forests, create in every State national forest plantations, from which, through all the years to come, a sufficient supply of wood and timber can be annually harvested to supply the needs of the people of each State from the forest plantations in that State; and that the necessary legislation should be immediately enacted by Congress to create the national forest reserves known as the White Mountain and Appalachian reserves.

2. That the Census Department and the Forestry Service of the Agricultural Department should be authorized to take a census of the standing timber in the United States in 1910, when the next national census is taken.

Resolutions adopted at a meeting of the American Society of Civil Engineers, New York, January 7, 1908.

Whereas the timber resources of this country are being rapidly diminished owing to unscientific methods of forestry, to the prevalence of forest fires, and to a wasteful use of timber, resulting in a steady increase in the cost of both hard and soft woods, and which may result, moreover, in the diminution of the natural storage capacity of our streams, an increasing irregularity in the flow and consequent impairment of the value of our water powers;

Resolved, That in the opinion of the board of direction of the American Society of Civil Engineers every endeavor should be made to further the introduction of principles of scientific forestry and the creation and preservation of national and State forest preserves, and in particular, the board of direction approves and urges the passage by Congress of a bill providing for national forest reserves in the Appalachian and White mountains.

Resolutions adopted by the Appalachian National Forest Association at Atlanta, Ga., January 16, 1908.

The Appalachian National Forest Association in convention assembled, representing a membership throughout the Southern States, with accredited delegates from the Atlanta section of American Institute of Electrical Engineers, the Georgia Federation of Women's Clubs, the Atlanta Women's Club, and chambers of commerce or boards of trade in Atlanta, Macon, Athens, Brunswick, Columbus, Cornelia, Dublin, Rome, Ga.; Newberry, S. C.; Charleston, Belton, and Spartanburg, S. C.; Huntsville, Mobile, Birmingham, and Opelika, Ala.; Nashville, Tenn.; Louisville, Ky.; Asheville, N. C.; the Greater Charlotte, N. C., do resolve as follows:

Whereas official statistics show that the people of the United States face within a decade a lumber famine, due to the wasteful and extravagant use and wanton methods of lumber and forest fires; and

Whereas our Appalachian forests are now being rapidly depleted and are about our only remaining source of hard-wood supply; and

Whereas the cutting already done has shown its baneful effects throughout the South and demonstrates forcibly from many standpoints the necessity of the conservation of this source of our natural wealth; and

Whereas the perpetuation of our forests can only be done by the natural wealth; and be it

Resolved, That the Appalachian National Association and affiliated bodies earnestly urge upon the Congress of the United States the establishment of national forests in the Appalachian region by the prompt passage of the Appalachian-White Mountain bill.

Resolved, That the governors of all the Southern States be requested to appoint at once delegations of not less than 20 members from their respective States to attend the hearing of the Appalachian-White Mountain bill on January 30 before the House Committee on Agriculture, and that the governors themselves head their respective delegations.

Resolved, That Gov. Hoke Smith, of Georgia, be requested to use his good offices with the governors of the other States in order to insure their prompt action in this vitally important matter.

Resolved, That copies of these resolutions be sent by the secretary of this convention to all Congressmen and Senators from the Southern States, requesting their hearty and active support and their votes for the measure.

Resolutions adopted by the Board of Trade of Providence, R. I.

Resolved, That the Providence Board of Trade heartily supports the action of the National Board of Trade in its approval of the project for national forests in the White Mountains and in Southern Appalachians.

A wise conservation of the forests of the East, which contain the principal supply of hard wood remaining in America, appears possible only by Government control; a timber famine that must of necessity restrict building operations and add greatly to all rents and therefore to the cost of living is already making itself felt throughout the nation. The mountain forests in these two regions govern the stream flow of most of the Eastern States, and we are convinced that their continued destruction involves devastating floods, alternating with droughts of increasing severity that will have a most injurious effect on navigation of rivers, upon vast industries now dependent on water power, and upon the climate and on agricultural productiveness.

The summer attractions of the beautiful White Mountain country are of benefit and enjoyment annually to thousands of Rhode Islanders, and many citizens of Rhode Island own property that will be very injuriously affected by the continued destruction of these attractions. The lumber supply of New England demands the cultivation of the forests for a permanent crop instead of their despoiling by wasteful and destructive methods.

The greatest prosperity of Providence demands that the States of New England shall not be stripped of their natural wealth and resources in ways now threatened, yet the destructive influences now at work are all located in States beyond our own, and relief may be obtained only by action of the National Government: Therefore be it

Resolved, That this board earnestly requests our National Congress to enact the legislation necessary to secure these national forests in the East; and farther be it

Resolved, That the members of the Rhode Island delegation in Congress be, and are hereby, respectfully urged to lend their assistance toward the carrying out of this important project.

(Signed)

GEO. H. WEBB, *Secretary*.

Resolutions adopted by the Carriage Builders' National Association at its annual convention in New York, October 8 to 10, 1907.

WILMINGTON, DEL., November 11, 1907.

MY DEAR SIR: The Carriage Builders' National Association of the United States, representing the vehicle industry and accessory trades using hard woods in their business, and being vitally interested in the future supply of these woods—hickory, oak, and other kinds—so necessary to their occupation, at their annual convention, held in New York October 8–10 of this year, unanimously passed the following resolution:

"Whereas it is the firm belief of the Carriage Builders' National Association that at the present rate of consumption the supply of hard woods will last but comparatively few years unless the remaining timber of this kind is conserved;

"Whereas the proposed national forest in the Appalachian Mountains offers a means of securing the main stand of hard-wood timber at present remaining in the United States, to serve as a source of permanent supply: It is hereby

Resolved, That this association heartily approves the establishment of a national forest in the Appalachian Mountains, and that a copy of these resolutions be sent to all Members of Congress."

We earnestly request your aid in this matter, which is of so much importance to the immense vehicle trade of this country.

Yours, sincerely,

HENRY C. McLEAR, *Secretary*.

Resolutions passed by the Parkersburg Chamber of Commerce on the 19th day of December, 1907.

As the result of a recent visit of the secretary of the National Forestry Association to the Parkersburg Chamber of Commerce, the following resolutions were adopted:

"Whereas the greater portion of the forests of West Virginia have been cut away without any attempt to plant new forests;

"Whereas the President in his message to the present Congress has declared 'That the country is unquestionably on the verge of a timber famine, which will be felt in every household in the land;'

"Whereas the present method of cutting down the forests, if the ground should be burnt over, leaves the ground unprotected and exposed to rains, which will speedily wash away the soil, rendering the land either forever barren or almost impossible to be replanted;

"Whereas the President has stated in his message that 'The waste of soil by washing, which is amongst the most dangerous of all wastes, now in progress in the United States, is easily preventable; that the preservation or replacement of the forests is one of the most important means of preventing this loss;'

"Whereas the continued cutting of our forests without any steps being taken to preserve or replant them will mean eventually the stopping of most of the vast number of wood-working industries in this State;

"Whereas the cutting away of the forests in this State has resulted in great and disastrous floods, which floods are growing more frequent and more disastrous as more of our forests are cut away, which floods have resulted in the destruction of untold amounts of property belonging to the citizens of this State;

"Whereas the soil washed from denuded forest lands has been carried into the channels of our navigable rivers and has been a great hindrance to the navigation of the Ohio River and its tributaries;

"Whereas the most immediate relief that can be given to the people of this State for the preservation of its forests, for the protection of its wooden industries, for the protection of its soil against waste by washing, and for the protection against disastrous floods in its establishment of national forests reserves in this State;

"Whereas the President has recommended to Congress that there should be acquired in the Appalachian regions all the forest lands that it is possible to acquire for the use of the nation;

"Whereas the rules governing national forest reservations do not prohibit mining, grazing, the proper cutting of timber and other proper uses when carried on under the rules and supervision of the Forestry Bureau, thereby practically allowing us all the real benefits to be derived from our mountain land as well as the many advantages obtained from national forestry reservations: Now, therefore, be it

Resolved by the Parkersburg Chamber of Commerce. That the Senators and Representatives in Congress from the State of West Virginia be asked to use every effort in securing national forestry reservations in West Virginia.

Resolved, That the various boards of trade, city councils, and other public bodies in the State be asked to pass and forward to our Senators and Representatives in Congress resolutions requesting them to do all in their power toward securing national forestry reservations in this State.

Resolved, That the secretary of the chamber of commerce be instructed to forward copies of these resolutions to our Senators and Representatives in Congress, to the various boards of trade, to the city councils, and to other public bodies in the State."

A certified copy.

W. W. JACKSON,
Secretary Parkersburg Chamber of Commerce.

Resolutions adopted by Chamber of Commerce of Pittsburg, Pa., June 13, 1907.

Whereas the Department of Agriculture, under an appropriation from Congress, is now making a study of the important watersheds of the Appalachian Mountain system with a view to recommending to Congress the establishment of forest reserves sufficient in area to protect the important streams of this region; and

Whereas this subject is of vital importance to the city of Pittsburg and this community, both with a view to preventing the increasingly destructive floods in the Monongahela and Allegheny rivers and supplying water for navigation purposes in dry seasons: Therefore, be it

Resolved, That the Chamber of Commerce of Pittsburg fully approves of the establishment of forest reserves on important watersheds of the Appalachian Mountains: that it respectfully requests the Secretary of Agriculture to extend northward to include the Monongahela watershed the surveys now being made by the Government: furthermore be it

Resolved, That a copy of these resolutions be presented to the Secretary of Agriculture, and also to the Representatives in Congress from Pennsylvania,

West Virginia, and Ohio, and that the latter be respectfully urged to support the movement looking to the establishment of national forest reserves about the headwaters of the important tributaries of the Ohio River.

Resolutions adopted by the National Association of Box Manufacturers at its annual meeting at Kaaterskill, N. Y., August 28, 1907.

Whereas our annual consumption of wood is estimated by the United States Forest Service to be three times greater than our annual production; and

Whereas under present policies we are rapidly approaching a timber famine; and

Whereas experience, both abroad and at home, proves that public ownership and administration of forest lands permits a continuous enlargement of the use of wood, while perpetuating the woods themselves: Therefore

Resolved, That we commend the policy of extending the area of our national forests; and

Whereas the southern Appalachian and White Mountain forests are of paramount importance, the former containing our last great stand of hardwood, and both protecting watersheds and thereby insuring equable stream flow throughout New England and the South, which, in turn, protects highly important industries; both, moreover, being areas of great natural beauty; and

Whereas at the present rate of cutting and burning a brief period will witness the complete devastation of both regions: Therefore

Resolved, That we strongly urge the Congress of the United States promptly to establish national forests in the southern Appalachians and White Mountains.

Resolutions adopted by the National Board of Trade at its annual meeting held in Washington January 21, 22, and 23, 1908.

Whereas the great natural resources are being dissipated for the purpose of present profit without regard to the future; and

Whereas the ordinary exercise of business methods and our duty to the generations of Americans to follow us demand that all natural resources should be protected and utilized consistent with the most intelligent methods; and

Whereas the continuation and development of foreign trade in manufactured goods depends largely on our ability to produce at the minimum of cost, it is therefore of vital importance that the waterways and water powers of the southern Appalachian and White Mountain regions, where hundreds of millions of dollars are now invested in manufacturing enterprises, shall be conserved and perpetuated by protecting the forest cover of these regions: Therefore be it

Resolved, That the National Board of Trade commends the policy of the Administration in the preservation of the national forests and redemption of arid lands by irrigation, and recommends the increase of forest ownership and control by establishing the proposed Appalachian and White Mountain reserves, and recommends that the present session of Congress shall take favorable action thereon. We also especially recommend that measures for reforestation be urgently pushed forward. It is also further

Resolved, That the National Board of Trade, appreciating the importance and value of accurate information as to the timber resources of the United States, recommends that such information be acquired through the cooperation of the Census Bureau and the Forest Service by the census of 1910.

Resolved further, That the National Board of Trade again urge upon Congress, as was done in the last message of the President to that body in relation to public lands, that they should, without further delay, pass the legislation necessary to carry into effect, fully and effectually, all the recommendations of the Public Lands Commission, as made in their report heretofore approved by the President and by him laid before Congress.

Respectfully submitted on behalf of the committee.

WM. S. HARVEY, *Chairman,*
Philadelphia.

IRENEE DU PONT,
Wilmington, Del.

S. B. VROOMAN,
Philadelphia.

C. HENRY HATHAWAY,
Springfield, Mass.

Resolutions adopted by the National Lumber Manufacturers' Association at the Jamestown Exposition in the week ending June 15, 1907.

Resolved, That the National Lumber Manufacturers' Association, in convention assembled, hereby voices its hearty approval of the policy of our Federal Government in establishing large forest reservations in various sections of our land, and would urge the Congress to give liberal consideration to such policy.

Whereas in view of our rapidly decreasing forest resources, it is of the greatest importance that an accurate determination be made of the kind and quantity of standing timber in the United States in order to secure a sound basis for plans for forest management and utilization;

Resolved, That we respectfully request the Forest Service and the Bureau of Census to undertake this work at their earliest convenience, and that we hereby pledge our heartiest cooperation to all efforts of the Government to secure information concerning any of the interests of the lumber industry.

Resolutions adopted by the National Association of State University Presidents at Washington, November 19.

The National Association of State University Presidents, believing that the acquiring of a national forest reserve in the Appalachian and White mountains is a national necessity in order to conserve our natural resources and to prevent the destruction of the vast area of arable land in the South, urgently represent to Congress that a bill providing for such forest reserve should be passed at the coming session, and we personally pledge ourselves to acquaint the people of the country so far as practicable with our views as to the national importance of this measure.

Resolution adopted by the National Hardwood Lumber Association, Atlantic City, May 24, 1907.

Resolved, That the National Hardwood Lumber Association indorses the survey provided for by the last Congress, looking toward the establishment of forest reserves in the Appalachian and White mountains, and that, in view of the rapid exhaustion of hard-wood timber and the importance of these regions for hard-wood production, it urges Congress to establish sufficient forest reserves in the Appalachian mountains to insure for the country a hard-wood-timber supply.

Resolutions adopted by the Slack Cooperage Manufacturers' Association at its meeting in Buffalo, June, 1907.

Whereas the success of the slack cooperage business in the United States depends upon a continued supply of hardwood; and

Whereas the sole remaining important stock of hardwood in the United States is located in the southern Appalachian Mountains; and

Whereas at the present rate of cutting the southern Appalachian forests will, in a few years, have disappeared; and

Whereas this process of forest destruction in these mountains is not only a direct menace to the slack cooperage business, but to other highly important businesses, including agriculture, commerce, transportation, and manufacturing, especially by water and electric power; and

Whereas what might be to 60,000,000, twenty-four hours distant, a great resort for the promotion of health and pleasure, is doomed, under the present policy of indiscriminate cutting, to certain destruction; and

Whereas the experience of Old World countries, already being confirmed in America, bears eloquent testimony to the disastrous effects of forest destruction; and

Whereas the only salvation for the forests of the southern Appalachian region, to gether with those of the White Mountains, lies in the establishment by Congress of national forest reserves in those mountains; and

Whereas legislation looking to this end has been unanimously passed by the Senate of the United States, recommended without dissent for passage by the House Committee on Agriculture, and approved in advance and urged for passage by the President; and

Whereas this legislation has been favored by the National Board of Trade, representing over seventy boards of trade and chambers of commerce, and

the National Cotton Manufacturers' Association, the National Wholesale Lumber Dealers' Association, the Civil and Electrical Engineers' Association, the Engineering Society of the Carolinas, the American Paper and Pulp Association, the Association for the Advancement of Science, the National Federation of Women's Clubs, the American Civic Association, numerous State legislatures, and a multitude of State societies and municipal and local bodies, and by industrial concerns representing over \$130,000,000;

Resolved, That the National Slack Cooperage Manufacturers' Association, in convention assembled, strongly urges the enactment of this legislation.

Resolved, That we commend the efforts made, and now being made, to promote this legislation; that we pledge ourselves, individually and collectively, to this effort, and that we appeal to all concerned to employ every right means to insure the establishment of these reserves by the Sixtieth Congress at its first session.

Copy of letter sent to Members of Congress from New England, January 17, 1908.

Boston, Mass., January 17, 1908.

A meeting of textile and other manufacturers representing business using water powers that originate in the White Mountains, was held in Boston on the 10th instant. At this meeting the undersigned were appointed a committee to request the Members of Congress from New England to use their earnest endeavors to secure at this session of Congress the passage of the White Mountain and southern Appalachian forest bill (H. R. 10457).

We beg to express our conviction that the passage of this bill, without further delay, is of the utmost importance to the States of New England and to the other States affected, and to urge your efforts to procure its enactment.

Very respectfully,

FREDERICK AMORY,
Treasurer Nashua Manufacturing Company.
 T. JEFFERSON COOLIDGE,
President Amoskeag Manufacturing Company.
 P. Y. DE NORMANDIE,
Of Bliss, Fabyan & Co.
 F. C. DUMAINE,
Treasurer Amoskeag Manufacturing Company.
 EDWIN FARNHAM GREENE,
Treasurer Pacific Mills.
 FRANKLIN W. HOBBS,
Treasurer Arlington Mills.
 CHARLES L. LOVERING,
Treasurer Massachusetts Cotton Mills.
 ARTHUR T. LYMAN,
President Merrimack Manufacturing Company.
 THEOPHILUS PARSONS,
Treasurer Lyman Mills.
 CHARLES A. STONE,
Of Stone & Webster.
 J. E. VARNEY,
Bay State Bank, Lawrence.
 WILLIAM M. WOOD,
Treasurer American Woolen Company.

For the committee:

PHILIP W. AYRES, *Secretary.*

(Care E. H. Rollins & Sons, 19 Milk street, Boston, Mass.)

Remarks made before the American Forestry Association by George Ward Cook, Haverhill, Mass., accompanied by a petition from cities of the Merrimac Valley.

In speaking on this forest reservation matter, I wish to say it has had a warm place in my heart for years.

The "Rhine of America" (the Merrimac) has interested me in many ways. One of its most prosperous boards of trade at the city of Haverhill was my conception and my interest extends to the twelve cities along its banks. I conceived the idea of having a brief petition favoring the bill now in Congress

indorsed by leading interests in the entire valley, and succeeded in securing one of the strongest indorsements possible, which includes the city governments, boards of trade, newspapers, banks (national and savings), water powers, mills, factories, merchants, and prominent persons such as would be recognized in the political, commercial and social world. The chief object being to demonstrate to the Speaker of the House of Representatives that the bill is worthy from economic reasons and should be allowed to come before the House. I did not seek quantity but quality, and have it.

Let us look at the situation and take for example the Merrimac River. While only 110 miles long, it turns more spindles and furnishes employment to more people than any other river on earth. The prosperity of the industries and the happiness of the people along its banks depend upon the continuity of the water which comes from the great watershed in the White Mountain region.

The denudation of the forest along its banks has already had its effect in floods in time of great precipitation and drought at other times. It is within fifteen years that Haverhill, where I reside, has suffered twice from the highest water ever known. There must be some reason for it.

Let us note the conditions of this prosperous valley and see if it is worth an effort to protect its industries and its people.

The river is formed by the junction of the Pemigewasset and Winnepesaukee rivers near Franklin, N. H. The principal places are Laconia, Franklin, Tilton, Concord, Manchester, Nashua, Lowell, Lawrence, Haverhill, Merrimac, Amesbury, and Newburyport, all thriving industrial centers.

Their value is shown by the thrift of the people who have invested in national banks, savings banks, and trust companies, which represent in capital, surplus, and deposits, the great sum of \$143,220,126.

Its water powers and factories employ 79,687 persons who earn in round figures \$37,000,000 yearly in wages. The capital employed being nearly one hundred millions, which together produce about one hundred and forty millions annually.

The population of this district is about 350,000 souls, while the assessed property valuation is something like two hundred and forty millions. There are several towns and cities on other rivers which rise in these same mountains. The banking interest of those in New Hampshire amount to \$10,000,000, and those in Maine to some twenty millions, which added to those previously named amount to \$162,833,086, all of which is dependent upon this reservation. I have not included the Connecticut River in these figures, which would amount to many millions more.

Now, while the White Mountain group is within the State of New Hampshire, it is proper that it should become a national reservation for every New England State is benefited directly save Rhode Island, and that State by its governor (I hold Governor Higgins' indorsement) is with us. Of the immense water resources, New Hampshire has only about 25 per cent, the other States having the benefit of the balance. We have treated this subject on its commercial and practical side only; let us look for a moment at its sentimental side. New Hampshire derives a revenue yearly of about \$7,500,000 from visitors, who come to enjoy its grand scenic beauty and invigorating atmosphere.

It will not be thus if the mountains are despoiled and waste places are the only views that meet the eye. Vast sums have been invested in hotels and a great array of people work therein.

We have to note the great destruction by forest fires, which are more harmful than the woodman's ax, and where the reservations have been established and properly policed, splendid results have been obtained. These reservations can be made self-supporting and in time yield a revenue. I have not spoken of the Appalachian Mountains, which while not so much developed, should have our attention. We should anticipate the future, and the next generation will bless us for it. We must leave no stone unturned to accomplish the result, and our watchword should be "Save the forests."

I thank you for the opportunity of adding my mite to this grand cause.

GEORGE WARD COOK.

We, the undersigned, recognizing the necessity of immediate action by our Representatives in Congress upon the bill already passed by the Senate, relating to the White Mountain and Appalachian Mountains Forest Reserves, do hereby urge their united effort in its behalf, that future destruction may be stayed and protection from forest fires be obtained.

Proprietors of Locks and Canals on Merrimac River, by Arthur T. Lyman, president, Lowell, Mass.

The Essex Company, by Howard Stockton, treasurer, Lawrence, Mass.

Amoskeag Manufacturing Company, by S. C. Dumaine, treasurer, Manchester, N. H.

Allen Chamberlain, president Appalachian Mountain Club, Winchester, Mass.

E. P. Shaw, ex-state treasurer of Massachusetts, and president of Electric Railways, Boston, Mass.

T. Jefferson Coolidge, treasurer Amoskeag Corporation, Manchester, N. H.

The Home Market Club, Boston, Mass., Albert Clark, Secretary.

Boston Merchants' Association, E. H. Walcott, secretary.

N. L. Sheldon, president Vermont Association of Boston.

F. W. Rollins, president New Hampshire Club of Boston.

Hiram F. Mills, engineer of locks and canals at Lowell, engineer of Essex Company at Lawrence, Mass.

Massachusetts Cotton Mills, Charles Loreing, treasurer.

Merrimack Manufacturing Company, Charles L. Loreing, treasurer.

Lyman Mills, Theop. Parsons, treasurer.

Bigelow Carpet Company, by Charles F. Fairbank, treasurer.

Lawrence Manufacturing Company, by C. P. Baker, treasurer.

Frank S. Streeter, attorney, Concord, N. H.

Hon. F. W. Rollins, ex-governor of New Hampshire and president of New Hampshire Forestry Association.

Hamilton Manufacturing Company, by Franklin G. Williams, assistant treasurer.

Tremont & Suffolk Mills, Lowell, A. S. Covill, treasurer.

Appleton Company, by A. G. Cummok, treasurer.

Hamilton Woolen Company, by F. J. Quinn, agent, Amesbury, Mass.

Wood Worsted Mills, Lawrence, Mass., by C. A. Hardy.

Everett Mills, by F. C. McDuffie, treasurer.

York Manufacturing Company, F. C. McDuffie, treasurer.

Carter, Rice & Co., corporation, by James Richard Carter, Boston, Mass.

J. N. Peterson, ex-mayor, Salem, Mass.

H. C. Perham, president, Lowell Machine Shops.

Representatives of Lawrence, Mass.:

Charles H. Littlefield, secretary Board of Trade.

H. Franklin Hildreth, past president Board of Trade.

Andrew B. Sutherland, president Lawrence Merchants' Association.

John P. Kane, mayor of city.

Cornellus A. McCarthy, treasurer Merrimack Cooperative Bank.

Joseph Shattuck, president Bay State National Bank.

James Houston, cashier Arlington National Bank.

Lewis A. Foye, treasurer Lawrence Savings Bank.

A. J. Crosby, cashier Pacific National Bank.

Albert I. Couch, treasurer Essex Savings Bank.

Cornellus A. McCarthy, treasurer Merrimack Cooperative Bank.

C. O. Andrews, treasurer Broadway Savings Bank.

H. L. Freeman, cashier Lawrence National Bank.

W. A. Whitney, treasurer Lawrence Cooperative Bank.

Benjamin R. Bradley, secretary Atlantic Cooperative Bank.

Hildreth & Rogers, publishers Lawrence Daily Eagle and Tribune.

American-Sun Publishing Company.

Lawrence Telegram, Kimball G. Colby, treasurer.

J. A. Perkins, cashier Merchants' National Bank.

R. J. Macartney, clothing merchant.

Bicknell Bros., clothing merchants.

Lawrence Gas Company, by F. H. Sergeant.

Charles F. Ross, for L. C. Moore Company, dry goods.

Robinson & Sutherland Company, dry goods.

G. H. Woodman Company, shoe dealers.

W. H. Gile Company, clothing dealers.

Representatives of Lowell, Mass.:

James B. Casey, mayor of Lowell.

Alonzo B. Walsh, president Lowell Board of Trade.

Joseph G. Pattee, city messenger.

Charles L. Knapp, treasurer Middlesex Trust Company.

Austin K. Chadwick, treasurer Lowell Five Cents Savings Bank.

J. F. Sawyer, cashier Union National Bank.

Representatives of Lowell, Mass.—Continued.

F. H. Pearson, president B. F. Butler Cooperative Bank.
 F. N. Chase, cashier Old Lowell National Bank
 E. E. Sawyer, cashier Prescott National Bank.
 Clarence W. Whidden, treasurer Central Savings Bank.
 William D. Brown, treasurer Lowell Cooperative Bank and Middlesex Co-
 operative Bank.
 J. F. Connors, actuary Lowell Trust Company.
 Thomas H. Murphy, treasurer Washington Savings Institution.
 Wm. F. Hills, vice-president Traders' National Bank.
 C. E. Goulding, cashier Wamesit National Bank.
 N. G. Lamson, treasurer Merrimack River Savings Bank.
 Edward B. Carney, treasurer Lowell Institutions for Savings.
 George E. King, cashier Appleton National Bank.
 Lowell Auto Corporation, W. H. Green, treasurer.
 The Lowell Sun, by E. G. Gallaher, editor.
 Lowell Mall, by John A. Lamberton, editor.
 Lowell Courier, by Sidney R. Fleet, city editor.
 C. I. Hood Co., manufacturing chemists.
 George W. Brothers, treasurer Lowell Gas Light Company.
 J. C. Ayer Co., by Charles H. Stowell, treasurer.
 Simpson & Rowland, wholesale grocers.
 J. L. Chalifoux, clothing merchant.
 Frank P. Putnam, clothing merchant.
 Walter T. Barstow, clothing merchant.
 Frederick B. Leeds, steamship agent.
 Frank E. Putnam, restaurant and provision dealer.

Representatives of Haverhill, Mass.:

Roswell L. Wood, mayor of Haverhill.
 Frank N. Rand, president Board of Trade.
 M. Warren Hanscom, Hanscom Hardware Company.
 The Kempton Company, E. J. Kempton, president.
 W. H. Floyd & Co., clothing merchants.
 Rowe & Emerson Company, clothing merchants.
 Nichols & Morse, clothing merchants.
 A. B. Blaisdell & Co., clothing merchants.
 J. H. McGovern, jeweler.
 A. M. Child, secretary Haverhill Board of Trade.
 Haverhill Gazette Co., by Robert S. Wright, treasurer.
 Fred F. Shedd, editor Gazette and vice-president Board of Trade.
 Record Publishing Company, William C. Bagley, manager.
 The Criterion, Lewis R. Hovey, publisher.
 George H. Carleton, president Pentucket Savings Bank.
 C. H. S. Durgin, president First National Bank.
 George W. Noyes, treasurer City Five-Cent Savings Bank.
 E. C. Wood, president Haverhill Savings Bank, trustee of the E. J. M.
 Hale estate.
 O. E. Little, cashier Merchants' National Bank.
 C. J. Halpen, treasurer Haverhill Trust Company.
 John E. Gale, president Haverhill National Bank and shoe manufacturer.
 Mitchell & Co., dry goods, by F. J. Mitchell.
 Rev. James O'Doherty, pastor of St. James' Catholic Church.
 Simonds & Adams, dry goods, by E. T. Adams.
 Jonathan Russ, cashier Essex National Bank.
 William H. Page, treasurer Haverhill Cooperative Bank.
 J. W. Goodwin, treasurer Citizens' Cooperative Bank.
 George Ward Cook, excursion manager and real estate.
 William E. How, stationer and news dealer.
 J. F. Croston, M. D.
 George E. Crane, druggist.
 Butler & Holmes, H. W. Butler and George N. Holmes, shoe dealers.
 E. L. Powers, shoe salesman.
 Wm. J. Desmond, shoe salesman.
 Coombs & Gilbert, furniture company.
 John F. Carter, clothing and furnishings.
 Perley Leslie, president Leslie Dry Goods Company.
 William W. Emerson, proprietor Emerson China Store.

Representatives of Haverhill, Mass.—Continued.

Milton Chase, inventor and promotor.
 Frank E. Tucker, furniture dealer.
 W. F. Thayer, cloaks, suits, and furs.
 M. F. Flynn, druggist, proprietor of three stores.
 Fred B. Fuller, advertising manager Gazette.
 Aaron Benjamin, restaurant keeper.
 Guy E. Sturgis, restaurant.
 Fred W. Peabody, pianos and music.
 Charles W. Arnold, president Merrimack National Bank and leather dealer.
 Horace N. Noyes, jeweler.
 Clarence A. Pettengil, jeweler.
 W. W. Spalding, shoe manufacturer.
 Joshua M. Stover, shoe manufacturer.
 Clarence E. Fuller, 178 Devonshire, Boston.
 Charles E. Smith, 178 Devonshire, Boston.
 George H. Cleveland, shoe dealer.
 Ralph E. Files, principal Haverhill High School.
 Franklin Woodman, general manager Southern New Hampshire Electric Railways.

Arthur L. Nason, representative of the general court.

Representatives of Merrimac, Mass.:

H. H. Story, selectman.
 F. C. Grant, secretary Board of Trade.
 F. L. Parker, druggist.
 F. C. Grant, treasurer Merrimac Savings Bank.
 W. B. Sargent, cashier First National Bank.
 Merrimac Budget, Clifton B. Heath, editor.
 J. B. Little Co., carriage findings.
 Walker Carriage Company.
 L. E. Lynde, manager Haverhill and Amesbury Street Railway Company.
 S. C. Pease & Sons, carriage manufacturers.
 Thomas H. Hoyt, attorney, president Merrimac Savings Bank.
 Zenas Lovel, grocer.

Representatives of Amesbury, Mass.:

Cyrus W. Rowell, selectman.
 William W. Hawks, president Amesbury Trade Association and the Chas. Wing Co.
 Amesbury Daily News, E. J. Graves, editor.
 Porter Sargent, cashier Powow River National Bank, and town treasurer.
 Alfred C. Webster, treasurer Providence Institution for Savings.
 Chas. H. Kimball, cashier Amesbury National Bank.
 Porter Sargent, treasurer Amesbury Cooperative Bank.
 Folger & Drummond, carriage manufacturers.
 Atwood Mfg. Company, lamp manufacturers.
 N. E. Collins, town clerk.
 G. C. Carter & Co., grocers.
 R. O. Bailey, furniture dealer.
 S. R. Bailey & Co., carriage manufacturers.
 Hassett & Hodge, carriage manufacturers.
 John Hassett, president Carriage Manufacturers' Association.
 T. W. Lane, carriage manufacturer.

Representatives of Newburyport, Mass.

Albert F. Hunt, mayor.
 W. F. Houston, ex-mayor and bank cashier.
 The Daily News, Fred E. Smith, editor.
 Newburyport Item, A. F. Hunt, proprietor.
 William Hsley, cashier Merchants' National Bank.
 L. W. Piper, treasurer Institutions for Savings.
 W. F. Houston, cashier First National Bank.
 Frank W. Woods, cashier Ocean National Bank.
 John A. Maynard, treasurer Newburyport Savings Bank.
 Fisher & Co., department store.
 C. C. Porter, clothing merchant.
 C. O. Townsend, house furnishings.
 Mrs. C. W. Hasleton, manager Guy's Restaurant.
 L. B. Curtis, jeweler.
 Osgood & Goodwin, dry goods.

Representatives of Concord, N. H.

Edward N. Pearson, secretary of state.
 Joseph T. Walker, assistant secretary of state.
 Burns P. Hodgman, clerk United States court.
 Henry E. Chamberlain, city clerk.
 David E. Murphy, president Board of Trade and dry goods dealer.
 The People and Patriot, Fred Leighton, city editor.
 H. H. Metcalf, secretary of Commercial Club of Concord and New Hampshire Board of Trade.
 Arthur C. Chase, state librarian.
 Merrimac County Savings Bank, F. P. Andrews, assistant treasurer.
 Merchants' National Bank, H. H. Dudley, cashier.
 Fred O. Ladd, treasurer Loan and Trust Savings Bank.
 Isaac Hill, cashier National State Capital Bank.
 Wm. P. Fisk, of the New Hampshire Savings Bank.
 A. C. Todd, Lincoln House.
 Walter L. Jenks & Co., hardware.
 Harry G. Emmons, dry goods.

Representatives of Manchester, N. H.

Eugene C. Reed, mayor.
 Fred T. Dunlap, secretary Manchester Board of Trade.
 Manchester Mirror, E. J. Knowlton, city editor.
 Manchester Union, R. W. Pillsbury, treasurer.
 George L. Kilbee, city editor of the Union.
 J. W. Condon, editorial writer of the Union.
 D. W. Perkins, attorney at law.
 Albert L. Clough.
 W. B. Sterns, cashier Manchester National Bank.
 L. W. Hunt, president Merchants' National Bank.
 C. M. Heard, president Amoskeag National Bank.
 N. S. Bean, national bank examiner.
 Geo. Henry Chandler, treasurer Amoskeag Savings Bank.
 C. E. Bisco, cashier Second National bank.
 Arthur H. Hale, treasurer Merrimack River Savings Bank.
 Leonard Smith, cashier First National Bank.
 Josiah Carpenter, president Second National Bank.
 Henry N. Putney, treasurer Peoples' Savings Bank.
 Walter M. Parker, president Manchester National Bank.
 R. K. Horne, merchant.
 James W. Hill Company.
 Dyer & Chipman, druggists.

Representatives of Nashua, N. H.:

F. W. Maynard, president Board of Trade.
 Jason E. Tolles, secretary Board of Trade, treasurer of Citizens' Institution for Savings.
 Ira P. Harris, cashier Indian Head National Bank and treasurer New Hampshire State Board of Trade.
 Joseph F. Clough, treasurer Nashua Trust Company.
 Milton A. Taylor, secretary People's Building and Loan Association.
 Wm. E. Spalding, cashier First National Bank.
 F. A. Eaton, cashier Second National Bank.
 H. A. Ramsbell, treasurer City Guarantee Savings Bank.
 Nashua Telegraph, by B. E. Warren, editor.
 L'Impartial, L. A. Bissom, editor.
 R. A. Arnold.
 Chamberlain & Patten Co., merchants.
 H. S. Whittemore, Whittemore & Ambrose, hardware.
 D. F. Runnells, clothing.
 Samuel Spence, dry goods.
 G. H. Wiley, grocer.
 R. A. Gorman, manager of Flour and Grain Company.
 G. M. Kittredge, manager of Bar Hardware Co.
 J. C. Woodward, harness.
 H. S. Nowell Co., W. S. Nowell, treasurer.
 Graham & Bell, Tremont House.
 W. E. Kittredge.

Representatives of Nashua, N. H.—Continued.

F. D. Runnells, attorney at law.
 Arther D. Martigeny, jeweler.
 N. J. Allton, grocer.
 H. M. Wilson, dry goods.
 Geo. S. Wheeler, piano dealer.
 F. M. Lund, boots and shoes.
 C. H. Avery, president of the C. H. Avery Co.
 J. B. Sexton, of Howard Sexton Co.
 Blanchard & Currier.
 George Parkhurst, Nashua Telegraph.
 J. Arthur Bernard, for Nashua Hardware Co.
 Geo. T. Jackson, attorney at law.
 E. E. Cheny, jeweler.

JANUARY, 9, 1907.

COMMONWEALTH OF MASSACHUSETTS, *Essex*, ss:

This is to certify that I, Geo. Ward Cook, of Haverhill, Mass., personally received the foregoing indorsement to this petition attached, and do certify to the correctness of this copy and that all who signed did so understandingly and thoroughly believed in the measure of the bill.

GEO. WARD COOK, *Notary Public*.

COMMITTEE ON AGRICULTURE,
 HOUSE OF REPRESENTATIVES,
Wednesday, January 22, 1908.

The committee met at 10 o'clock, a. m., Hon. Charles F. Scott (chairman) in the chair.

The CHAIRMAN. Mr. C. J. Jones, perhaps better known by his sobriquet of "Buffalo Jones," is here this morning, and I believe the committee would be interested in hearing him for about fifteen minutes. He has been conducting some very interesting experiments in the crossbreeding of buffalo with cattle, and more recently in the crossing of Persian sheep with our native species, and if there is no objection we will hear from Mr. Jones now.

STATEMENT OF MR. C. J. JONES.

MR. JONES. Mr. Chairman and gentlemen of the committee, I have been experimenting in the hybridizing of animals, as the chairman has mentioned, for a great many years. About twenty years ago I was ranching in western Kansas, and a blizzard came and destroyed almost all my cattle, and when I went into Texas after them, I found that the buffalo were just as sleek and fat as if nothing more than ordinary had happened, and I said to myself: "Why not graft this blood onto my animals so that they can utilize this wonderful plain here, and get more results from it," and I went to work on that, and I bred a great many cows, not at that time, but two years after that, and I secured two crossbreeds, heifers, and from that on I have been experimenting more or less ever since. I have obtained a wonderful animal. It takes the characteristics principally of the buffalo. It has the hump, which is the storehouse they draw on in case of starvation, and they never starve while they have that. They have 14 ribs on a side, instead of 13 like the ordinary cattle, and they can travel many miles without water and without fatigue. They also

have a stomach laid with the layers, the manifolds, so closely together that they can digest everything that is digestible. Even the Kaffir corn, which is as hard as flint, is ground to powder and is utilized, every bit of it. I find they are wonderful animals. They can live without artificial food or shelter. Most of my original herd went to the Flathead Indian Agency, but I bought them back about two years ago, and I persuaded the Department of Agriculture to allow me to graze them on the forest reserve, as I was not able to buy a place to graze them myself, and the Department and myself agreed that if they would allow me to graze on this reserve I would continue the experiment for the benefit of the Agricultural Department. I have one of my reports here, and through our honorable Secretary, who gave me that privilege, we have made progress, and we are very proud of what we have done. I have sold robes as high as \$350 apiece from those cattle, and I have sold heads that brought \$500 apiece. Of course these heads were magnificent specimens, and for a good many years you could not expect to produce many of them.

There are a great many demands, and it takes more money than one individual ought to provide to carry this out systematically and according to scientific principles. I am not asking any money for myself at all, but there are things on that reserve that can be fixed up for the benefit of the game preserve that would be of great advantage to us in our work. We need corrals, we need to separate these animals, and to have certain classes together, and we need a pasture fence to prevent them from drifting away, and such things, and we need some help; a superintendent or something of that kind would be very good to have along with it.

The CHAIRMAN. How many head of these hybrids have you now?

Mr. JONES. Fifty-eight, I think, now, of the hybrids, and then I have 14 full-blooded buffalo on the range now.

The CHAIRMAN. When you interbreed the hybrids, do you get a pretty good type?

Mr. JONES. My overcoat which I am wearing here is made of the skin of one of these interbred animals, three-fourths buffalo and one-fourth Galloway. You can get an idea from this of what it is like. This animal was killed pretty young. That is what I call interbred. It is bred with a buffalo bull. The collar is made of a Persian lamb-skin. You know what the Persian lamb is; it is what the ladies make their coats of. I have about 20 head of those Persian sheep.

The CHAIRMAN. Put the coat on, please.

Mr. JONES. Well, I did not want to make a show of myself, but at the same time I am not ashamed of it. [Mr. Jones here put on the coat.] This coat is pretty warm for this part of the country, but for farther north and for automobiling it is just the thing. There is nothing like a buffalo robe, because the steam of a man's body will escape and not keep him so heated up and warm and sweaty as an ordinary coat.

We have a great deal of difficulty in finding out about the males of these crossbred animals. The males are not fertile, as a rule, but some of them are. We find that the one-eighth buffalo is fertile, but the three-fourths buffalo is not fertile, as far as we can find out, although there have been some calves born from the three-fourths and seven-eighths cows. We think the seven-eighths bull is fertile, and

that is what we are trying to do, to get an animal that will be fertile and that can reproduce itself. That is the catalo. I have named it the "catalo," the word being a combination of the two words cattle and buffalo, the c-a-t for the cattle, and the rest of the name for the buffalo. We have found a great deal of difficulty in getting just exactly what we want with the buffalo.

As to the crossbred sheep, they are all fertile, both males and females.

The CHAIRMAN. You have not stated to the committee where you got your start in breeding the sheep.

Mr. JONES. I got hold of the Persian bucks and went to crossbreeding them. They came from California. Now, they can not get those animals out of the old country, because back there they know that they have got millions of dollars each year, sending out these lamb-skins to the different countries, and they will not let them go out of the country; but one of our ministers was presented by the Sultan of Turkey with half a dozen of these animals, and he took them to California and put them near San Jose, and they bred them there and experimented with them for a while, but the sheep got into the irrigated country where it was soft and muddy, and they got the foot rot, and they are pretty nearly all exterminated with the foot rot. I picked up here and there a few of those Persian sheep. Now, I knew the benefit of the great hump of the buffalo, and I knew that it was a plains animal, and was adapted to that country, and I saw that great hump that those sheep had on the rump, that weighs 20 pounds at times, and that convinced me that they were an animal also for the plains, and that they would live also without food for weeks at a time and would stand any storms or inconvenience such as they have on the plains, and would be able to live under those severe conditions where the snow sometimes covers up everything, and that if they did not get their food they would draw on that hump and live, and I was very anxious to test them, and I found they proved out the same.

The CHAIRMAN. How much larger are they than the ordinary sheep?

Mr. JONES. Nearly half as large again. I have had them that weighed 80 pounds at 3 months old. They are a third larger anyway.

The meat of the sheep produced by this hybridizing is wonderful. It is nearer like the reindeer meat than anything else, and that is the best meat outside of that of the mountain sheep. That is said to be the best meat in the world. The hybrid comes nearer to that than anything else. I took some of this meat to New York and I went to the Belmont Hotel, and the steward and the manager both tried it, and the manager said that it was the finest meat they ever tasted; that I had reached the limit of perfection in meat, and they said that they could use a thousand of my lambs, and the price they offered me was pretty near double what they pay for the other sheep. The wool of the little Persian lambs is fine, but when they get large, the hair is coarse and long; but by crossing with Merinos you get a wool that is long, a long staple, and is fine enough for any kind of work. The manufacturers tell me it is just what they need, and it brings just as much per pound as any other wool. We clip these hybrids twice a year, in the spring and in the fall. There is a world

of good and benefit that can be brought out of this hybridizing. If Mr. Burbank and the Department of Agriculture can improve your fruits and flowers the way they have done, animals can also be improved, and I have found that animals are just as susceptible as anything else to hybridizing. People think it is wrong to improve upon God Almighty's work, but that thing is passing away. If it had not been for man and God Almighty together, we would never have had the American Beauty rose, and all our other beautiful cultivated flowers, and we never would have had seedless oranges, and many other things of that character. God Almighty laid the foundation, and left it to us to finish it up, and there is work enough for us, and a thousand times more, for generations to come.

What I wanted was to get help to bring some of the animals from the Yellowstone Park. I need some of them. I find that a buffalo bull in order to cross on a domestic cow must be raised on a domestic cow. I went up in that country, up into the mountains 60 miles on snowshoes, when I was game warden there and brought out a couple of those buffaloes, and they will cross with the cows, and I want some of those bulls. I asked for some of them, and the President said to Secretary Garfield, "Now, Jim, let Jones have what he wants, if you can," and Secretary Garfield says they will let me have three of those bulls for \$300 apiece. But bless my soul, you fellows got up this financial crisis here the last few months and caught me with all the money I had in the bank, and I haven't got a thousand dollars, and I want the bulls. You have stocked that up and made a national park out of it, and you have put the buffalo there, and if you have two sets of herds you will have something on which you can rely; you will have an assurance that you will not lose them all if anything happens to them in either place. Then the elk and the deer and the antelope, I want some of them. I have plenty of deer, but the elk and the antelope I would like to have, and I say make an appropriation so that you can go ahead and carry out this work in connection with the Department.

The CHAIRMAN. Do you want to breed your Persian sheep with the mountain sheep?

Mr. JONES. Yes, sir; I want to test the mountain sheep with the hybrids, the new variety of sheep we have there, and see if we can not get a better animal—something that will take care of itself and that will climb out of the way of the wolves and will defy the coyotes, and so forth. I want to cross it with this fine meat sheep and see what it will bring.

Mr. LEVER. How much money do you want?

Mr. JONES. A whole game preserve, 60 miles square, can be fenced in with a fence of about 15 miles. The rest is fenced in naturally by the natural walls. The chairman said they would take in the winter range, so as to give us a winter range. By a 15-mile fence you can fence in 60 miles square.

Mr. LEVER. Where is that?

Mr. JONES. On the north side of the Grand Canyon, in Arizona. It is fenced in most of the way by natural walls.

Mr. LEVER. What will this fence cost?

Mr. JONES. It will cost \$1.25 a rod. Twenty thousand dollars will be enough for making this fence and building the corrals and making all these improvements.

The CHAIRMAN. Are there any herds of cattle or sheep grazing there now?

Mr. JONES. Yes, sir; the forest service let out what is needed; that is, they let out some, but there is worlds and worlds of it there going to waste.

The CHAIRMAN. This fence would help rather than hinder in their work?

Mr. JONES. Yes; it would help to keep the cattle in and keep the other people's cattle off.

Mr. POLLARD. What kind of a fence would you build?

Mr. JONES. If I should put in all kinds of animals I would want to build an 8-wire fence, and they would never break through that.

Mr. POLLARD. Barbed wire?

Mr. JONES. Yes. There are the finest posts in the world there—cedar posts.

The CHAIRMAN. Your buffalo are running there?

Mr. JONES. Yes; there is where we have all our buffalo, right inside there, and it has been a great expense for us to have men to keep them and herd them and take care of them.

The CHAIRMAN. Have you corrals there?

Mr. JONES. We have temporary corrals, but they are not sufficient. We want to divide the herds and test the three-quarter bulls and the one-quarter and one-eighth bulls, and see just exactly what they are. We want to separate them and keep them in different pastures, and see what is good and what is not. If we turn them all in together, we do not know which calves belong to them. The Department of Agriculture gets all the benefit of my work. I make reports to them for the use of the preserve.

The CHAIRMAN. I understand that all you are receiving now from the Government in any shape or form is the free use of the preserve?

Mr. JONES. Not free use. We are giving 5 per cent of the hybrids to the Agricultural Department for experimenting in their stations. We have 10 of the hybrids now that they are entitled to, and we are giving them an immense thing; when you come to find out that those animals are becoming so valuable, we are paying them more than the people are paying for the grazing privileges. So we are not beggars by any means.

Mr. LAMB. Does the hybrid develop the hump to any great extent?

Mr. JONES. Yes, sir: I am only sorry I did not have some photographs with me to show you the difference, but when I came over from New York I did not bring any photographs.

Mr. LEVER. How does your hybrid compare with the ordinary buffalo?

Mr. JONES. They are like all other hybrids; they exceed the parent on either side in size. They are one-third larger than the buffalo or the cattle.

The CHAIRMAN. What will the buffalo weigh?

Mr. JONES. Take them right off the grass in the dead of winter, they will weigh a thousand pounds. I killed 16 a few years ago, and they averaged up over 900 pounds. They are pretty near as fat in the dead of winter as in the summer. The only trouble with the cows is that they keep too fat to breed. We have got to keep them up in pens, and see that they do not get too much to eat and drink, and we have actually got to take them out and run them 5 or 6 miles a day

before we can get them to catch in calf. Any animal, when too fat, will not get in young—that is, become fertile.

Mr. POLLARD. What strain of cow do you breed?

Mr. JONES. The Black Galloway I find is the best. They are the strongest. It is a very hard matter for a cow to carry a calf, because she fills with water to a great extent, and it is very trying. The Galloways have more strength and endure better than any of the others.

Mr. BEALL. What do you call the hybrid?

Mr. JONES. Catalo.

Mr. BEALL. Did you ever see the herd of cattle on the Goodnight ranch?

Mr. JONES. Yes; I have been there.

Mr. BEALL. How do they compare with your hybrids?

Mr. JONES. Very well. Goodnight has some hybrids that are very fine. We could send these hybrids to Alaska and utilize that country as well as any other. I think they would live beyond the Arctic Circle.

Mr. BEALL. Will these hybrids reproduce?

Mr. JONES. The one-eighth is fertile. We never had a half-blood catalo. They all come females. I have never secured a bull yet, and I have raised 30 or 40.

Secretary WILSON. That is very interesting.

Mr. JONES. There are lots of things interesting that I have not the time to tell you, and I do not think of these things all at once; but it is a thing that ought to be tested thoroughly. You spend millions of dollars here to introduce things which are very important, but here is a meat industry that is more important, a thousand to one, than things you are spending money on, and it is just as susceptible of accomplishment, and more so. If you get an animal that will live without artificial food or shelter you will make it possible for people to go on these western lands and live without raising crops, without irrigation.

Mr. BEALL. How do the hides of these animals compare with the hides of ordinary cattle?

Mr. JONES. This coat of mine is a three-quarters hide.

Secretary WILSON. That gets some of its excellence from the Galloway.

Mr. JONES. Yes; it gets its luster from the Galloway. In the sun that sparkles like diamonds.

Mr. BEALL. That is very much finer than the buffalo hide.

Mr. JONES. Oh, yes. You have not got that red vein on the shoulder.

Secretary WILSON. We have sent up about 40 Galloways to Alaska.

Mr. JONES. Galloway cattle?

Secretary WILSON. Yes.

Mr. JONES. I expect you will find them very good, and if you could send up some catalo it will be a great improvement.

Secretary WILSON. We can breed catalo up there, can we not?

Mr. JONES. Certainly; if you know how. The first time I bred cattle I used 96 cows and got only 2 calves, and the last time I got 60 per cent of calves. It is a difficult business unless a man knows how to do it, and I want to prove up my work and see if I can do it again.

It is mostly in the selection of the cows, and there is a world of study necessary to find out just what is necessary to get the best results.

This has been very expensive to me. I have spent several little fortunes in it. To be sure, I expect some day to get back all that I have put into it; but it is a work that no one person should be expected to do, in which no one person should be expected to do all that I have done. In fact, I would like a little help, not that I care for the money, but while I am living I would like to carry this through for my own satisfaction and for the satisfaction of having the great animal developed to where we ought to have it. I do not expect to live always. I am not getting scared, but I do not want to be working for year after next for this thing or that thing, but I want to do it right along.

Mr. HAWLEY. I would like to ask you a question about the trimming you have on the collar of that coat?

Mr. JONES. That is a Persian lambskin.

Mr. HAWLEY. There is a popular notion that that is the skin of a lamb taken from the mother by the cesarian operation. You do not do that?

Mr. JONES. No; that skin was taken after the lamb was born. It was ten days or a week old, probably. The longer they grow the coarser they get.

Mr. HAWLEY. Is that a hybrid or a pure blood?

Mr. JONES. That is the skin of a pure blood; one that got accidentally killed.

Mr. COOK. Do I understand that you are crossing the Rocky Mountain sheep with these Persian sheep?

Mr. JONES. I want to; but they want to charge me \$100 for one, and it will cost a good deal to get it there. I think they ought to let me have it. I am working for the Government.

Mr. COOK. A few years ago the Colorado legislature passed a law prohibiting by fine and imprisonment the killing of a Rocky Mountain sheep.

Mr. JONES. Yes; or touching them.

Mr. COOK. The demand for the meat was so great that hunters made a business of killing off the sheep, and there were very few left. They are now multiplying fast; and I want to say to you gentleman that there is no meat in the world so desirable as that meat on the table.

The CHAIRMAN. The only question that occurs to me is whether it would be well for us to undertake practically an experiment that involves the capture of so wily and difficult an animal as the Rocky Mountain sheep.

Mr. JONES. When it comes to that, I want to say that I catch everything. That is my business. You can catch the mountain lions; you can go up in the trees after them and rope them and carry them down; and I want to say that the sheep in the park are just as gentle as the sheep on your farm. We feed them regularly, and they are just as gentle as can be, except you must not put your hand on them. All you have got to do is just to select your buck and drive him in and put him in the corral and put him in a crate and send him over. I know all about those things, and it is no trouble at all.

Secretary WILSON. Who asked you \$100 apiece for them?

Mr. JONES. Secretary Garfield. He wrote me that I could have a buck for \$100. He said that he could not very well lend them without a bond. I do not know anything about that, but I think they ought to take some of them over and stock up that mountain preserve. You have a preserve there without any game on it except the deer. Why not stock it up and have an ideal game preserve? That is what I suggest. It belongs to the Government, and it is Government work, and it ought to be done.

Mr. GILHAMS. Do you intend to cross the Rocky Mountain sheep with the sheep you have?

Mr. JONES. Yes, I want to. It has been done. I had a friend in Montana who had three or four of those bucks come down out of the mountain to his sheep. I said to him "What did you do with them?" He said "Oh, we killed them for mutton." The idea of killing such a valuable animal as that. Buffalo Bill had two of them with him, but he lost them.

Mr. GILHAMS. Are the hybrid sheep of the Rocky Mountain sheep fertile?

Mr. JONES. I do not know. They have been known to cross. The probabilities are that they are.

Mr. GILHAMS. Your idea was to stock this new Government preserve with the hybrids?

Mr. JONES. No, no; stock it with the original animals, and let me use some of them to carry out my work. The hybrids are too valuable to turn loose. People want them for breeding, and all that. Send them out through the country. If there is nothing further, I am much obliged to the committee.

The CHAIRMAN. We are very glad, I am sure, to have heard Mr. Jones.

COMMITTEE ON AGRICULTURE,
HOUSE OF REPRESENTATIVES,
Monday, January 27, 1908.

The committee met at 10 o'clock a. m., Hon. Charles F. Scott (chairman) in the chair.

The CHAIRMAN. We have under consideration this morning the estimates of the Bureau of Soils. Doctor Whitney, the chief of that Bureau, and some of his associates in that work are before us and will be heard, but before introducing them I would like to ask the attention of the committee to some remarks our colleague, Mr. Underwood, of Alabama, has asked to submit. We will hear Mr. Underwood now.

STATEMENT OF HON. OSCAR W. UNDERWOOD, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF ALABAMA.

Mr. UNDERWOOD. Mr. Chairman and gentlemen of the committee, I come here because I am very much interested in this particular work, and I do not come only to represent myself, but I can say this morning that I come prepared to represent my section, because I have here, and I wish to file it with the committee and have it printed in the hearing, a petition signed by the various Members from almost all the

Southern States. Some of the States did not sign it—two of them did not—because there were differences in the delegation, and they did not care to sign for that reason, but even in those two States of the Southern and Southeastern States a majority are in favor of the proposition that I wish to put before the committee of an increased appropriation. I will ask that these petitions may go in the record, not as a matter of influencing this committee, because I know you gentlemen are going to determine what you think is necessary, but I do it from the standpoint of saying to you and of saying to the House that there is a very large section of this country that believes in this work, is earnest in it, and wants increased appropriations, because they believe it is necessary in order to develop the agricultural interests of that section of the country.

I myself believe that the work of the soil survey and of the various divisions of the Bureau of Soils is doing more good to the farmer who stands behind his own plow, the farmer who has had a limited education, who has had small opportunities of learning scientific and practical agriculture, than any other bureau of the entire Agricultural Department, because it is bringing it right home to him. I think the soil survey is a great work; I believe it is a necessary work. It occupies the position of the engineer who makes the horseback survey in going over the country to lay out the line of the railroad that the men must come afterward and build along. You can not build a railroad without a horseback survey. A horseback survey can not run a railroad, but it is important and necessary. The Government has spent a great deal of money in the past in making soil surveys in the United States. If you stop at the soil survey. Mr. Chairman, you have absolutely, in my judgment, thrown away that much money. When you make a soil survey of a country and print it and send it out to the average farmer, you have accomplished nothing whatever for him. He has the satisfaction of seeing a pretty map of his county and of knowing how the soil survey classifies the soil that is on his farm, but he knows nothing about it. But if you follow up that soil-survey work by putting a practical man there who knows what those particular soils can produce, the soil survey is the diagnosis of the case. If you follow it up with the utilization man after you have diagnosed the case, you have given the patient the necessary medicine to cure him of the disease, and the disease among a great many farmers of the country is a lack of knowledge of what their soils can produce, and of how to diversify their crops.

Mr. McLAUGHLIN. Do you think it will be necessary after the Department has advised the landowner what his land will raise, then to furnish him his seed and tell him how to put it in and how to cultivate it and reap it?

Mr. UNDERWOOD. I do not think it is necessary. I am sorry my friend looks at it from a standpoint of that kind. I do not represent a farming district. I represent a manufacturing district, largely. My people are largely engaged in making iron and steel, but I know that when the farmer has had bad crops, when agriculture has not succeeded, there is nobody to whom we can sell our iron and our steel rails, and if we want this country to prosper, we must see prosperity come to the agricultural classes. We are away behind any other country of the world, any other civilized country. There is not a

first-class government in the world except the United States that has not got the government behind agriculture and its development, and in this government of ours where we have been spending \$100,000,000 a year for battle ships without anyone to fight except the wars that are made in the yellow journals——

Mr. WEEKS. You do not mean for battle ships?

Mr. UNDERWOOD. For maintenance of the Navy, I should say. We are spending hundreds of millions of dollars for the Army and other purposes, and I believe we are now spending something like \$10,000,000, or in that neighborhood, for agriculture in the United States, and \$2,000,000 of that is going to pay a tax, to aid the beef industry in Chicago, and not going to agriculture at all. I think if there is one criticism we can make on the expenditures of this Government in the last ten years, the most serious criticism we can make is that the Agricultural Department has not kept pace with the growth and development of the country, and that Congress has not done its duty along that line, and has not given the agricultural interests of this country the full benefit that can be given.

Mr. LAMB. Have you followed these increases of salaries and increases of the appropriations for the Department, my friend?

Mr. UNDERWOOD. I have nothing to say against the increase of salaries, but I do not see where the increase of salaries is doing the farmer any good.

Mr. LAMB. It is getting the most efficient men in the Department.

Mr. UNDERWOOD. I think you ought to do that.

Mr. LAMB. I asked you that in response to your statement that you did not think that we had kept pace with the growth and development of the country.

Mr. UNDERWOOD. Your increase of salaries may be a matter of justice, and very probably is, paying an efficient man what he is worth; but that is not carrying agricultural knowledge to the people of the country. You have still got the same man there that you had before.

Mr. LEVER. Do you happen to know how this increase of the appropriation for the Agricultural Department of the country compares with the increase for the Navy Department of the country?

Mr. UNDERWOOD. I know it is very small. I have not made an exact calculation as to the percentage, but there is no comparison at all. When I first came to Congress here, we were appropriating \$35,000,000 for the Navy, or something like that, and now we are appropriating \$100,000,000 for the Navy. When I first came to Congress we were appropriating for agriculture about \$6,000,000, and today I think we are appropriating about \$10,000,000; and as I say, half of that goes to the beef industry in Chicago and not to agriculture.

The CHAIRMAN. Perhaps I had better correct that statement.

Mr. UNDERWOOD. Certainly; if I have made a mistake, I hope you will correct it.

The CHAIRMAN. The appropriations carried last year by this bill were \$9,000,000, in round numbers, and that did not include the amount appropriated by another committee for the meat inspection to which you have referred.

Mr. UNDERWOOD. I did not have the figures exactly.

The CHAIRMAN. So that the total appropriation is in the neighborhood of \$13,000,000.

Mr. UNDERWOOD. And \$9,000,000 of that is really for agriculture?

The CHAIRMAN. Yes.

Mr. UNDERWOOD. Then there has been an increase in appropriations along agricultural lines of about \$3,000,000 in the last ten years.

Mr. McLAUGHLIN. You evidently misunderstood what I said. I believe firmly in these soil surveys. I believe they are doing great good, and I would like to see them continued, and made in your section of the country; but how far do you think it is necessary or advisable for the Government to go beyond those soil surveys in the way of assisting the farmers in the selection of their seed, the planting of the crops and taking care of them? I have suggested soil surveys in my section, but I have an idea that after that department has made a soil survey and suggested to our people the kind of crops suitable for that soil, then it is up to our people, and they will do the work.

Mr. UNDERWOOD. I do not believe the Government should go any further, or that it is necessary for the Government to go any further, than education. I am not advocating the Government furnishing seeds or furnishing plow hands, but I do believe that every other civilized government in the world is giving the best information along lines of agricultural education to the agricultural classes in its country, and we are not doing it in this country.

Mr. COCKS. Do you know any country that is giving any more actual demonstration work than we are?

Mr. UNDERWOOD. I do not know about the demonstration work, but I understand that in Germany and in Japan they are far in advance of us in the information and the education that they are giving to the agricultural classes.

Mr. COCKS. As I understand, you want to go further than that? You want to put the actual demonstrator right into the country?

Mr. UNDERWOOD. Here is what I want to ask the committee to do, and I believe in it thoroughly. I can illustrate it if you will let me digress and make a personal illustration. A great many years ago, before the civil war, Blount County, up in the hills north of Birmingham, used to send its wheat and its apples down into south Alabama. For many years I heard people in going through southern Alabama speak about the Blount apple. That had practically gone out; war had wiped out the orchards and they had gone to pieces, and there was nothing left of that industry. Finally I asked the Department of Agriculture to send a soil expert into that country, and he went and looked up the reports and looked up the old orchards and found a few trees and reported that one of the finest of winter apples could be raised in that county, and had been raised in that county, but he also came back and said to me that there was not a single man in that county who knew how to prune his apple trees. They did not know how to cultivate or prune them. They had gone to raising cotton right after the war and had let this industry lapse, and they did not know how.

You may publish all the bulletins you want to, and scatter them broadcast over the land, and you will never teach one farmer how to prune his apple trees, but if you have one soil expert and one tree expert in that State who can go on the field and show the men how to do the work, you will educate them along that line, and they will take it up.

The CHAIRMAN. You do know, I think, Mr. Underwood, that the work to which you refer is carried under another bureau. The Bureau of Plant Industry is conducting the cooperative demonstration work on a very large scale through its division of farm management and otherwise, the very purpose of which is to teach men along the lines you have suggested, to carry the information which the Department gathers by research and investigation to the individual farmer. I presume you would hardly suggest that a soil survey was necessary in order to teach a man how to prune his apple trees?

Mr. UNDERWOOD. No; but I give that as an illustration to show how you must carry the work down to the individual farmer, or you will not get results.

The CHAIRMAN. We realize that, fully.

Mr. UNDERWOOD. As to the other bureaus, they are doing good work, but they are not carrying the information to the farmer. They have some experimental farms that have done a great deal of work. They have one in Alabama that has demonstrated the possibility of raising alfalfa and hogs. That has done good work there. But that is in one small county. It does not reach the farmers. The farmers in that immediate neighborhood go there and see, and otherwise it is simply an experiment being carried out by the Agricultural Department to demonstrate what it can do along that line, and it then goes into a bulletin, and the farmers do not see it. A farmer in Alabama can not travel from north to south Alabama, 100 or 200 miles, to see a demonstration at a Government experiment station. What I contend is this: That the practical way to accomplish this result and bring this education to the farmer is to follow your soil surveys with the soil-utilization man, put him wherever you have got a soil survey made, put a soil-utilization man there who knows the soils, who can tell the farmer himself what and how he ought to plant, and can go on his field and demonstrate it. The soil-survey man does not have to go to every farm. He can go to every county seat occasionally, and he has got the surveys, and he can advise the farmer in a practical way, as a physician, and he comes in contact with the farmer, and in that way you will educate the farmer up to the improvement of agriculture as you can not do otherwise.

The CHAIRMAN. Do you think it is any more necessary to have a soil physicist than to have a plant physicist to visit the farmer?

Mr. UNDERWOOD. I assume if you send out a man of that kind, eventually you will have one man who is thoroughly informed on all agricultural questions. This Bureau of Soils is trying to make these soil surveys for the benefit of the farmer, and to bring them practically to him, and that is where it starts.

The CHAIRMAN. You will pardon me for suggesting that I think upon inquiry you will find that a great deal of the work you are asking the Soil Survey to do is being done by the Bureau of Plant Industry. To cite an illustration, the Soil Survey, as a result of its surveys, located a great many tracts throughout the South where they thought tobacco could be raised. Having located such tracts, they turned them over to the Bureau of Plant Industry to teach the people how to raise the tobacco, and that work is being done.

Mr. UNDERWOOD. That work was done in my district, and very successfully, not by the Bureau of Plant Industry, but by the Bureau of Soils.

The CHAIRMAN. It has been transferred to the Bureau of Plant Industry.

Mr. UNDERWOOD. I understand that it has been transferred to the Bureau of Plant Industry. Take it in Perry County, they did not know that they could raise a pound of tobacco. They did not know that land was valuable for tobacco, but when they made a soil survey they discovered a soil that would raise Habana filler tobacco, and that tobacco is being raised in merchantable quantities and is being put on the markets and is being manufactured now and is being sold to the consumer, if I am not mistaken, some of it as Habana tobacco; but nevertheless it is raised in Perry County, Ala., no matter how it is sold, and they have demonstrated that it can be raised and have developed an industry down there, and that was done by this Bureau of Soils. It is only this last year that work was transferred to the other Bureau. But if that soil survey, Mr. Chairman, had been made and published and distributed to those farmers, and you had stopped there, the development of that tobacco industry would never have come; they could not have learned how to raise tobacco or to plant it. Nothing would ever have come of it if the Bureau of Soils had not sent these practical men there into the field and taught the farmer how to plant the tobacco and how to raise it and where to sell it. Now that industry is on its feet, and it is running itself.

Mr. COCKS. Did not the South raise lots of tobacco before we had the Bureau of Soil Surveys?

Mr. UNDERWOOD. Some portions of the South did, in Kentucky and in North Carolina; and I am not indicting the American people for fools. I think in the course of time our agricultural interests will be developed, and they will reach the higher standards themselves, probably one hundred or two hundred years from now, if you want to wait, but every first-class nation on the face of the globe is doing this for its people, and I do not see any reason, when we are spending \$800,000,000 for the maintenance of this Government, why we should cheese-pare so far as the agricultural interests are concerned, when agriculture is the very basis of our prosperity.

Mr. LAMB. Let me say right here that the members of the committee are as much interested in this subject as you can possibly be.

Mr. UNDERWOOD. I know they are.

Mr. LAMB. And I think the records will show that we have responded liberally to the requests of the Secretary of Agriculture, and sometimes even, in some appropriations, have gone beyond what he suggested.

Mr. UNDERWOOD. Just one minute. I will say to my friend from Virginia that I am not criticising the committee, but I have my views and I am telling you right from the shoulder what they are. I do not think this committee should be hidebound by the recommendations of anybody. I believe we ought to listen to what the executive portions of the Government have got to say on all questions, and as to what they need to carry out their plans; but when it comes down to really what money we are going to appropriate and what we are going to do, this is a separate branch of the Government, and if we believe in the development of agriculture we ought to give the money to the Secretary of Agriculture whether he says that he wants it or

not, and tell him to carry out these things. That is the position to take.

Mr. COOK. You have referred to the survey of soils. I would like to know what you mean by that remark. I am a new Member, and I am not very familiar with these things.

Mr. UNDERWOOD. You mean the soil survey?

Mr. COOK. Yes; I would like to know what you mean by that statement. What is the survey of soils?

Mr. UNDERWOOD. I could explain it to you, but Mr. Whitney, who sits here, could explain it very much better.

Mr. COOK. Your reference is to which particular part of your State?

Mr. UNDERWOOD. I say the Bureau sent the soil experts down there and surveyed the soil of Perry County, and they found out what was in the soil, analyzed it, and discovered we had a very fine tobacco soil, and they have developed a tobacco industry there.

The CHAIRMAN. In order to correct a misapprehension under which it is apparent you are laboring, I would like to read you some figures I have before me here as to the agricultural appropriation acts, running back to 1881. I will take the last six years, that being the period you referred to, and I find that for the fiscal year ending June 30, 1902, the appropriation was \$4,500,000, to use round numbers, while last year the appropriation was \$9,200,000, not including, as the former figure did, the cost of the meat inspection. So as a matter of fact the appropriations for this Department during the last six years have much more than doubled, and I doubt very much whether you would find any other Department that had increased in like proportion.

Mr. UNDERWOOD. The Navy Department has increased fourfold and the War Department appropriation has nearly doubled.

The CHAIRMAN. I think you will find that in 1902 the appropriation for the Navy Department was greater than it is to-day.

Mr. UNDERWOOD. The committee just stands, then, on a few years. I was referring to the last ten years, and I think that the appropriation in the last ten years had reached \$6,000,000.

The CHAIRMAN. They did not reach \$6,000,000 until two years ago, in 1906.

Mr. UNDERWOOD. I know the increase was very small, anyway, but I did not have the figures in my head. The increase is only \$5,000,000.

The CHAIRMAN. An increase of 50 per cent is not bad, is it? Could you expect a Department to grow much more rapidly than that?

Mr. UNDERWOOD. I think it is a better increase; but it does not cover the field.

Mr. WEEKS. The estimates for this year are \$10,600,000. That is an increase of 15 per cent over last year.

Mr. UNDERWOOD. I am very glad to see that the estimates are increasing, but I still contend, Mr. Chairman, that the Agricultural Department to-day is not reaching out and covering the field, or beginning to cover the field, that it ought to cover.

The CHAIRMAN. You must realize that this is work for experts. You can not go out into the highways and byways and hire men to do this work, and in a number of these departments, for instance, in the Forestry Bureau and other bureaus, we are told that they are

extending the work just as rapidly as they can get expert men to do it. It would be utterly impossible for this Department to expend \$20,000,000 next year, because they could not find the men to do the work.

Mr. UNDERWOOD. I admit that is a very just criticism of what I have stated, that you can not find the men. But you can never find the men if you do not give them the money to find them with. If you give the Agricultural Department a large increase of appropriation they will find the men to expend it, and if you start out along the line of giving them the money to increase this work as well as they can next year and next year, they will do it.

Mr. HEFLIN. Increasing the demand for these men?

Mr. UNDERWOOD. Increasing the demand for the work; and you will accomplish that result. I am sure the same is true of the corn and the wheat fields, but, of course, I do not come from a corn or wheat country, and therefore I can not speak of that.

You have one soil utilization man in Alabama, and he is doing this work for the farmers of Alabama. Just to illustrate, let me tell you one thing that he is doing. You know that a salt-water fish can not thrive in fresh water, and a fresh-water fish will die in salt water. If you take a seed that is raised in a sandy, soft soil and plant it in a thick, hard clay soil, you are not going to produce any results with that seed; or if you change the process around and take a seed that has been produced in a hard soil and bring it to a soft, sandy soil, you are not going to produce any results with that seed. Our people had been buying cotton seed here and there, from newspaper advertisements, often, and they proved worthless and in many cases produced disastrous results, and a great protest has been coming from Alabama. This man has found out where all the cotton seed is raised in the country, what comes from a sandy soil and what comes from a clay soil and what the results are, and he has educated the farmers to-day to buy seed that is adapted to the class of land they have got, and he is instructing those who do not know the class of land they have got. If he finds that a farmer is cultivating a soft, loamy soil, he advises him to buy seed that was propagated and developed in that sort of a sandy soil, so that it will swim in the kind of water, so to speak, that it is adapted to, and I need not go into details as to the result, because Mr. Bonsteel is here and can explain it himself, but the result has been a very great increase, as is shown by practical experiment, of the cotton crop of Alabama, by the amount produced per acre.

Mr. POLLARD. I would like to inquire what your State is doing along this line.

Mr. UNDERWOOD. Alabama is doing more than any other State in the Union that I know of.

Mr. POLLARD. In what way?

Mr. UNDERWOOD. It is so anxious that this work should be done that the State of Alabama said to Professor Whitney, the chief of this bureau, if you will come down here and do this work and finish your soil survey at once, we will pay half of the money, and Mr. Whitney agreed to do it. They have passed an act in the legislature appropriating half of the money to do this soil-survey work, and have turned it over to Mr. Whitney—that is, he directs it, he and the

commissioner of agriculture in Alabama, and they are doing the work, but it is done under Mr. Whitney's direction—and the Government of the United States is only paying one-half of the cost of that work we are doing along this line in Alabama. Is there any other State in the Union that is doing any more? That shows that our people believe in it. They are putting up their own money to do it.

Mr. POLLARD. Do you attribute the increase in the yield of cotton of which you speak altogether to the Bureau of Soils, or does the Bureau of Plant Industry have anything to do with it?

Mr. UNDERWOOD. I do not think the Bureau of Plant Industry has done anything along that line in Alabama. It is doing some good work in south Alabama on an experimental farm in raising alfalfa and hogs, but as I say, the work they are doing does not reach the individual farmer. This gentleman goes into the field, and where the farmer is, and he tells the farmer where he is making his mistakes, and I believe there is no way you can educate him and bring him up to the highest standard of agriculture except to go on the farm. The reason I am asking for this appropriation is that I want it. I went to Professor Whitney and asked him if he could do this work for me, and he said that he could not, and I asked him why, and he said that he did not have the money.

Mr. POLLARD. Do you think that we can afford to provide money to send a soil expert to every farm in the country?

Mr. UNDERWOOD. I think you could afford to send one to every district. I do not think there is any better expenditure of money you can make than to appropriate enough money to send a practical soil-utilization man into every agricultural district in the United States where the farmers can advise with that man as to the better means of agriculture, and where he can get out and educate them along agricultural lines and bring the practical scientific work of this kind to the farmer. You are doing the scientific work here in Washington well, I do not question that, but you are not getting the results to the farmer, and you are not going to do it by starting a farm off to one side that he never sees, or by sending him a bulletin.

Mr. LEVER. Your plan is to change the method of education?

Mr. UNDERWOOD. I do not find fault with what you are doing, but appropriate enough money to send a soil-utilization man into every district.

Mr. LEVER. Your idea is to change it so as to get the scientific information to the farmer?

Mr. UNDERWOOD. To increase the method of getting it to him. I understand that \$200,000 or \$300,000 increased appropriation will do this work.

Mr. HAWLEY. The Bureau of Plant Industry told us that they had work down there now which was directing the farmer as to how to select good seed, how to get a cotton that would produce a larger crop and be resistant to the diseases that the cotton has incident to it. Will this work you speak of by the gentlemen of this bureau be co-operative with the work of that bureau?

Mr. UNDERWOOD. Certainly. That is good work.

Mr. HAWLEY. There will be no duplication of work?

Mr. UNDERWOOD. I am not asking that you interfere with their work, or that you should cut it down or eliminate it. It is good work; but you are not bringing it to the farmer. That is what I am asking for, that you should put a man there that could bring this scientific work into the home of each farmer, and let him study it.

Mr. HAWLEY. This gentleman who is studying the boll weevil evil told us how he was bringing it to them.

Mr. UNDERWOOD. He is right with them and studying it.

Mr. HAWLEY. He is bringing leading men in the communities together and organizing bodies of men to help in that work.

Mr. UNDERWOOD. I think he has done something of that sort; but in the end you can not bring this to the farmers unless you put a man there that the farmers can consult with.

Mr. HAWLEY. Would you be willing that the Government should put an expert bookkeeper in every district in the country?

Mr. UNDERWOOD. No; this Government does not need to do that. We have enough expert bookkeepers now.

Mr. HAWLEY. Why do you not need them also?

Mr. UNDERWOOD. We have plenty of them now.

Mr. HAWLEY. Do you not think the farmer ought to make some effort himself in this line, and not have it carried to his door indefinitely?

Mr. UNDERWOOD. I think when we get the farmers of the country well educated along scientific lines they will probably continue the education themselves, but we have not got it to-day; and now the whole proposition is this, there are some people who say that the work that this agricultural bureau is doing is not work that the Government of the United States should be involved in. Some go so far as to say that it is not constitutional and that we are violating our constitutional authority.

Mr. HAWLEY. Is that not somewhat on the line of States rights, Mr. Underwood?

Mr. UNDERWOOD. Yes; but I do not agree with them. But I do say this, that if you take the position that this is an infringement of States rights as an excuse for not doing the work, then there is but one conclusion that you can come to, and that is to abolish the whole Agricultural Department and wipe it out. But if you will go and do the work, if you have the power to do it, then do it right.

Mr. WEEKS. Would you be in favor of making an appropriation for any specific work in the State, conditional on the State making an appropriation for that purpose?

Mr. UNDERWOOD. No; I would not. I do not see why the Government should not do it itself. I do not see why the Government should not send a soil utilization expert into Massachusetts to go around to the farms and teach the farmers how they can bring new life back into those abandoned farms, as they have done in New York. They have done that in New York. They have taken up abandoned farms there and shown the people what new crops they could raise and how to fertilize them, and have put the people back on the abandoned farms there, and they can do it in Massachusetts, and I believe that if the Government is going to do work along that line it should not ask the State of Massachusetts to do it. The State of Alabama has done it voluntarily, and if a State wants to do it that is a different question.

Mr. WEEKS. Of course I made that suggestion without any reference to locality.

Mr. COCKS. Do you know in what particular part of New York there have been so many abandoned farms?

Mr. UNDERWOOD. I read the pamphlet about it that was published by the Department not long ago. It is in upper New York. There is a very considerable portion of the State there in which most of the farms have been abandoned. Can you answer that question, Doctor Bonsteel?

Mr. BONSTEEL. Yes; in Tompkins County we counted 199 farm buildings and in Madison County 230. We found that those two counties probably contained more of them than any other two counties there.

Mr. COCKS. Are they absolutely abandoned? The people have gone away and left them?

Mr. BONSTEEL. I have never used the term "abandoned" in connection with those farms. There are probably three-fourths of them which do not bring in return enough to pay the taxes, but, of course, some one owns them. Even if they have gone under a tax sale, some one has bought them as a speculation, so that you could not say any farm in that case is absolutely abandoned; but so far as productive agricultural occupation is concerned they are abandoned.

Mr. HAWLEY. You have an agricultural college in Alabama?

Mr. UNDERWOOD. Yes.

Mr. HAWLEY. And an experiment station associated with it?

Mr. UNDERWOOD. Yes.

Mr. HAWLEY. Does your State appropriate any money for the holding of farmers' institutes, or the dissemination of agricultural information by the teachers or scientists in your experiment station?

Mr. UNDERWOOD. It does. I do not remember exactly how it is made, but the State contributes to the support of the agricultural station at Auburn.

Mr. HAWLEY. Do they contribute a sum of money by which the experiment station could carry its knowledge of the experiments to the farmers?

Mr. UNDERWOOD. I know the experiment station publishes these bulletins.

Mr. HAWLEY. But do they go out and visit the farmers?

Mr. UNDERWOOD. Yes. I presume the Government pays for it; and they hold farmers' institutes, too.

Mr. HAWLEY. In this report of the experiment station no fund is set down here as appropriated by Alabama.

Mr. UNDERWOOD. I presume it is a general appropriation for the agricultural college, and part of it is used for that purpose.

Mr. HAWLEY. And part of it is used for that purpose?

Mr. UNDERWOOD. I know that they do hold the institutes and publish the bulletins, and I do not suppose the professors are publishing them at their own expense; it must have been at the expense of the State.

I thank the committee very much for the hearing they have given me, and although I have expressed my opinions very clearly, I want the committee to understand that I am not criticising them, because I know that like all the other committees of the House you have a

great deal of work to do. But I do think that if you want to continue the great work you are doing for the people of the United States—and I believe that you are doing greater work than any other in increasing agriculture because it is the very basis of our prosperity—if you want to continue this and bring it to the farmers, you must continue these soil surveys to give the basis for the work, and you must put a soil-utilization man in every farming district of this country and bring the practical knowledge home to the farmer, and then you will accomplish the result you are driving at; but otherwise it is mere experimental work that is going on in Washington, and the scientific work done here will go out to the scientists, but it will never go to the farmer's home.

Mr. HAWLEY. How many of these men will be necessary?

Mr. UNDERWOOD. There are 384 districts in the United States, and I suppose you ought to have 300 men.

Mr. HAWLEY. How long will it take to get the men?

Mr. UNDERWOOD. I suppose that to enter into the work and to accomplish it fully it would take ten or fifteen years.

Mr. HAWLEY. Then, as new investigations developed better methods, you would have to go to work again?

Mr. UNDERWOOD. Yes, keep the men to advise the farmers. It is not a great cost. Think of the number of deputy sheriffs you have scattered over this country. One man in each district should accomplish this and increase the results very much, indeed.

Mr. COCKS. One man to each farmer?

Mr. UNDERWOOD. One man to each district.

The CHAIRMAN. The committee has been very glad to hear Mr. Underwood, and without objection the petition which he submits will be entered in the record as a part of his remarks.

The petition referred to is here printed in the record, as follows:

We, the undersigned, Members of Congress from the State of North Carolina, recommend that the appropriations for the Bureau of Soils, of the United States Department of Agriculture, be increased to \$500,000, in order to provide for the immediate extension of the excellent work being done along the line of the development of the soils of the country.

JNO. H. SMALL.
E. Y. WEBB.
R. N. HACKETT.
W. T. CRAWFORD.
ROBERT N. PAGE.
CLAUDE KITCHIN.
CHAS. R. THOMAS.
EDWD. W. POU.
H. L. GODWIN.

We, the undersigned, Members of Congress from the State of South Carolina, recommend that the appropriations for the Bureau of Soils, of the United States Department of Agriculture, be increased to \$500,000, in order to provide for the immediate extension of the excellent work being done along the line of the development of the soils of the country.

A. F. LEVER.
J. O. PATTERSON.
GEO. S. LEGARE.
JOS. T. JOHNSON.
D. E. FINLEY.
WYATT AIKEN.
J. E. ELLERSB.

We, the undersigned, Members of Congress from the State of Georgia, recommend that the appropriations for the Bureau of Soils, of the United States Department of Agriculture, be increased to \$500,000, in order to provide for the immediate extension of the excellent work being done along the line of the development of the soils of the country.

CHAS. G. EDWARDS.
J. M. GRIGGS.
THOS. W. HARDWICK.
GORDON LEE.
WM. M. HOWARD.
C. L. BARTLETT.
E. B. LEWIS.
L. F. LIVINGSTON.
W. C. ADAMSON.
THOS. M. BELL.

We, the undersigned Members of Congress from the State of Alabama, recommend that the appropriations for the Bureau of Soils of the Department of Agriculture be increased to \$500,000 in order to provide for the immediate extension of the excellent work being done along the line of the development of the soils of the country.

WILLIAM RICHARDSON,
Eighth Alabama District.
O. W. UNDERWOOD, Ninth Alabama District.
J. THOS. HEFLIN, Fifth Alabama District.
A. A. WILEY, Second Alabama District.
JOHN L. BURNETT,
Seventh Alabama District.
GEO. W. TAYLOR, First Alabama District.
H. D. CLAYTON, Third Alabama District.
R. P. HOBSON, Sixth Alabama District.
W. B. CRAIG, Fourth Alabama District.

We, the undersigned Members of Congress from the State of Tennessee, recommend that the appropriations for the Bureau of Soils of the United States Department of Agriculture be increased to \$500,000 in order to provide for the immediate extension of the excellent work being done along the line of the development of the soils of the country.

CORDELL HULL.
L. P. PADGETT.
F. J. GARRETT.
JOHN A. MOON.
GEO. W. GORDON.
W. C. HOUSTON.
T. W. SIMS.
JNO. W. GAINES.
W. P. BROWNLOW.
NATHAN W. HALE.

We, the undersigned Members of Congress from the State of Arkansas, recommend that the appropriations for the Bureau of Soils of the United States Department of Agriculture be increased to \$500,000 in order to provide for the immediate extension of the excellent work being done along the line of the development of the soils of the country.

R. B. MASON, First District.
CHAS. C. REID, Fifth District.
JOE. T. ROBINSON, Sixth District.
ROBT. M. WALLACE.
S. BRUNDRIDGE, JR.
J. C. FLOYD.
BEN. CRAVENS.

Mr. Cocks. I have here a resolution adopted by a committee of the Central New York Farmers' Club which relates to this matter of

abandoned farms which I would like to have inserted in the Record. This is taken from the Utica Press, of August 22, 1907, and reads as follows:

NUMBER OF DESERTED FARMS HERE—FARMS INCREASING IN VALUE—PRODUCE SELLS AT GOOD PRICES.

The committees appointed at the recent picnic of the Central New York Farmers' Club at New Hartford met yesterday morning at the Grange Exchange, 48 Lafayette street, and adopted resolutions in regard to "Deserted Farms" and on the "Condition of the Apple Crop." The matter of "Water Transportation" was postponed until a later date in the absence of O. S. Foster, one of the committee.

Those present at the meeting were: President Joseph E. Graham, John W. Wood, W. E. Grannis, E. P. Powell, George B. Smith, Eugene Porter, and Secretary George A. Sanders.

The following resolution was adopted in regard to the matter of deserted farms:

"Whereas, We are informed that a convention is to be called, based on the assertions that farming is in a bad way in New York State, that farmers are drifting into the cities, and that farm lands are depreciating in value.

"Resolved, That we, the Central New York Farmers' Club, officially deny all these statements. We affirm that the drift cityward was reversed at least ten years ago, and is setting strongly toward the country at the present time. We affirm that land values are slowly rising, and that for our crops we are receiving from one-fourth to one-third more than we received fifteen and twenty years ago. We affirm further that the data used by those who are calling the convention is old and no longer applicable to farming conditions in this State. There are no abandoned farms in this section. Our neighbors in Connecticut and Massachusetts used to publish every year a list of abandoned farms; this they have stopped because the number is so rapidly decreasing.

"Resolved further, That the last thing we need in New York State is a whine over farm conditions, nor do we feel that we are in any condition to be petted or patronized, or made political capital of. We protest against the proposed legislative appropriation for the purposes suggested in the call of the convention. Our reliance for more rapid development of farming interests is in our agricultural college and a widened sphere of industrial education."

Mr. COOK. I would like to ask the gentleman who spoke of those two counties in New York State whether those counties are in this district?

Mr. BONSTEEL. No, sir; they are not. That is one of the points that could be made in connection with that resolution. There are sections of New York State that are as prosperous as any sections of the country. Take the counties along the shore of Lake Ontario, where they are engaged in the apple business, and they are more prosperous than any other sections outside of the great grain raising country. There are sections through the Mohawk Valley and the Hudson Valley and on western Long Island which are reaching the acme of their success in agriculture, and there are sections more remote, farther from railroads and from markets, where these conditions do exist, and I think where our central New York friends are not familiar with conditions.

The CHAIRMAN. We have with us Doctor Whitney, chief of the Bureau of Soils, and I will ask him to make whatever statement he desires to make in regard to the work of his bureau; speaking of that bureau generally to begin with, and afterwards we will ask him to go over the estimates with us in some detail.

COMMITTEE ON AGRICULTURE,
HOUSE OF REPRESENTATIVES.
Monday, January 27, 1908.

AFTERNOON SESSION.

The committee met at 2 o'clock p. m., Hon. Charles F. Scott (chairman) in the chair.

The CHAIRMAN. We will interrupt the hearing of Doctor Whitney, with his consent, in order to hear our colleague, Representative Small of North Carolina, who wishes to make some observations.

**STATEMENT OF HON. JOHN H. SMALL, A REPRESENTATIVE IN
CONGRESS FROM THE STATE OF NORTH CAROLINA.**

Mr. SMALL. Mr. Chairman and gentlemen, I shall be very brief, and I only desire to submit a few observations upon the educational work of the Department of Agriculture. Professor Whitney this morning, in reading from the act creating the Department, quoted substantially the words that its object was to furnish advice and information upon matters pertaining to agriculture; therefore whatever best accomplishes that object subserves the purposes for which the Department was created.

Representing a district in which the population is largely engaged in agriculture, perhaps three-fourths of its people directly and indirectly dependent upon the soil for their livelihood, early in my service in this body I endeavored to adopt some means of bringing the benefits of this Department home to the people of the district, to the farmers of the district. For several years I was quite industrious in sending out farmers' bulletins, selecting them with care, pertaining to such subjects as in my judgment were of most practical interest to them in their work. I would ask my colleagues from the cities for their copies of the Yearbook, and subsequently in going about among the people in their homes, I observed frequently that farmers' bulletins had not been opened, and that the Yearbooks, which contained information of great value, were used as ornaments for the book shelves. Further reflection upon the matter convinced me that the results of the experiments and the investigations of this Department could not be carried to the people so as to give them the greatest information and the best results without adopting some means of reaching them in person.

I have reached the conclusion that there are two most effective ways of reaching them. One is through what are known throughout the country as the farmers' institutes. In that way, if the farmers can be induced to attend and they have live men to conduct those meetings, much good can be accomplished; but in practice these farmers' institutes in my State, and I have no doubt that the same observation applies to other States, have not always been productive of the best results, because effective efforts were not made to induce attendance, and because the proper men were not present to lecture and to discuss topics of agriculture. The men who were there either were not thoroughly conversant with their subjects, or were men who

had not the faculty of imparting what they knew in an attractive and instructive manner. I believe that this Department could do nothing better than to furnish of its quota of men in the several bureaus, either to cooperate with the State departments of agriculture in holding farmers' institutes, or by whatever name they may be termed, holding independent meetings, whichever method may be best calculated to bring the work of the Department home to the individual tiller of the soil. I do not know to what extent the feeling exists in other States, but in my own State there is a disposition upon the part of the State board of agriculture to assume primary supervision of these institutes or farmers' meetings. I can see no objection to that, provided that purpose is actuated in good faith and with a desire to cooperate sincerely and effectively with the representatives of the United States Department of Agriculture, and wherever that can not be done I believe this Department should hold independent meetings in order to bring its work home to the people. I am thoroughly satisfied that another method must be adopted; that is, what has been undertaken under the supervision of Dr. S. A. Knapp, of Louisiana, who calls his work, I believe, demonstration work.

The general scope of his work, as I understand it, is sending men into a circumscribed territory consisting of one or two, three, or four counties, depending largely upon the similarity of soil and upon climatic conditions and upon other arbitrary reasons as to the extent of territory which this representative shall cover, and the method is that this person shall visit from time to time the farmer, talk with the farmer, advise with him as to the character of his soil and its capacity for different crops, as to the fertilization of the soil and the best method of preparing those fertilizers, and the best methods of cultivation. I believe that with these two methods, within a generation a practical evolution would gradually be accomplished in methods of agriculture which would increase products, which would decrease the cost of production, which would increase the prosperity of the farmer. Those are the two ideas which I wish to submit to the committee. To what extent conditions are now ripe to enter upon them largely, or more largely than at first, I am not prepared to speak advisedly, but I do insist that there are abundant and substantial reasons to put each member of this committee upon inquiry, to the end that gradually, and in my judgment as rapidly as possible, the work of the Department in these two lines should be increased, because thereby only can we hope that the work of this Department shall become practically effective and illustrative of the farm life of those who till the soil.

I do not speak of that with reference to this Bureau of Soils alone. As the chairman aptly said this morning, it is applicable to the Bureau of Plant Industry; it is applicable, in my judgment, to the Bureau of Public Roads, and not only to those, but to the other bureaus of the Department, and I would not omit, because I would emphasize that, the work of the experiment stations, which have in hand drainage investigations. I think perhaps the time is distant when the United States shall undertake to drain any of the swamp lands, but certainly this work of education may aptly and properly embrace visiting the swamp areas of our country, ascertaining whether they

are susceptible of drainage and reclamation, and where they are so susceptible making plans for carrying that work into effect. That, I believe, the Department of Agriculture is now prepared to enter into, with the encouragement of this committee and of Congress.

I did not wish to detain the committee long, and I simply desired to submit those two suggestions.

The CHAIRMAN. I may say to you that the suggestions you have made are directly in line with the sentiment of the committee, touching particularly the necessity of finding the best possible way of carrying to the people the immense amount of information that is brought out by the research and experiments of the Department, and we are very glad, indeed, to know that in anything we may do along that line we shall have your support.

Mr. SMALL. Thank you. I would suggest, Mr. Chairman, that in presenting your bill to the House—and I do not think any chairman has yet touched upon that phase of it—you would accomplish a good purpose by outlining the views of the committee upon that point.

The CHAIRMAN. I had that in mind. The committee will now resume consideration of the work of the Bureau of Soils.

COMMITTEE ON AGRICULTURE,
HOUSE OF REPRESENTATIVES,
Tuesday, January 28, 1908.

The committee met at 10 o'clock a. m., Hon. Charles F. Scott (chairman) in the chair.

The CHAIRMAN. When the committee adjourned yesterday we had not completed the consideration of the estimates of the Bureau of Soils, and we had expected to have Doctor Whitney to continue the first thing this morning. Since the adjournment, however, Representative Roberts, of Massachusetts, has advised me that a committee from that State who are particularly interested in the work that has been done by the Department of Agriculture toward the extermination of the gypsy moth and the brown-tail moth is in the city, having come here at this time under an apprehension that the committee was considering now the question of making an appropriation for the continuation of that work next year. As the committee knows, of course, that appropriation has been carried in a special item of the bill from the beginning and the consideration of that item would not have been reached in regular course for a week or ten days; but, in view of the fact that these gentlemen are here and have come a long distance in order to make their representations to the committee, it would seem hardly courteous to refuse them a hearing, and so, with the consent of the committee, we will interrupt the hearing of Professor Whitney for the present and ask Mr. Roberts to present his friends.

Mr. ROBERTS. Mr. Chairman, if I may be permitted, I will call on Prof. A. H. Kirkland, in charge of gipsy-moth work in Massachusetts.

STATEMENT OF MR. A. H. KIRKLAND.

Mr. KIRKLAND. Mr. Chairman and members of the committee, it is perfectly true that we came here under a misapprehension. My information, which I received possibly indirectly, was to the effect that this honorable body was to consider the question of an appropriation for gipsy-moth work in New England at this time, and hence I came down here by direction of his excellency, Governor Guild, of Massachusetts, to briefly state to you, and to explain, the work of United States Department of Agriculture in assisting Massachusetts in our battle against the gipsy moth, and to state the situation at present, and indicate the needs of our State, at least, for further help. I will not take the time to go into details. Of course many of you are familiar with the fact that the State of Massachusetts up to 1900 spent upward of a quarter of a million dollars in trying to wipe out this gipsy moth, which is practically an omnivorous insect, in this country a hundred times more injurious than in Europe. In the winter of 1899-1900 the pest was practically under control; there was no devastation, and there had not been for several years. Our legislature dropped the whole work, many of them believing that it was a humbug. The insect did not wait for the action of the legislature, but kept right on and multiplied at the rate of 500 to 1, and so in 1903 and 1904 we had tremendous gipsy-moth outbreaks of such a character that our people rose up in arms and demanded of the legislature that this work be taken up.

It was taken up in the summer of 1904, and the first appropriation was \$75,000. For 1906 \$150,000 was appropriated, and \$295,000 for 1907. We are doing this work under a cooperative system, though, whereby every property owner has to pay a certain part of the cost of clearing his trees, and every city and town has to pay a part of the cost of clearing the public trees in the parks. I made some careful figures in 1906, taking all three sources into account, and found that in 1906 we spent, by a rough but fairly accurate estimate—because there is only one item estimated, namely that of the contribution of private owners—\$750,000. This last year my figures are not complete, but they will exceed those of 1906. That is what we are doing in our State. I mention that to show that we have been giving evidence of the faith that was in us. We are not asking the Government to bear our burden, but we are spending liberally of our own money. The National Government work has been in our State supplemental to what the State is doing.

This pest is spreading and has spread over all the New England States except Vermont. In our State the Government very helpfully has endeavored to check the main means of the spreading of the gipsy moth. The caterpillar drops from the trees along the roads, and automobiles and electric cars and vehicles of all sorts gather it up and carry it for many miles. It has now spread over our State as far west as Springfield, largely by these means of transportation of the insect. Of course it travels, too, but it is largely spread in this way. Doctor Howard's department, through a very well-organized force of men, ably directed and working in absolute harmony with our State, has gone to work and cleared what we call protected belts along our main avenues of travel in Massachusetts. That

involves the care of street trees along the main roads and electric car lines and steam railroads, and the cutting back of a 100-foot belt on each side of a street, and spraying, and I would say that the State of Massachusetts takes care of the minor roads and streets, and in that way we covered in Massachusetts last year 9,000 miles of streets and roads, more than one-third the circumference of the globe, and we have found that that method of work, particularly the work that Doctor Howard's department is doing, has been most helpful.

I have at the present moment 1,500 men, roughly speaking, engaged in this work on the moth in Massachusetts. I have about 70 trained men, educated in the last few years, so that they are expert like expert anglers or expert deer hunters, scouting, as we say, inspecting our western border towns to see how far this moth has gone. We have found that we have a larger extension of the gipsy moth westward in our State than we expected. Yet we found in every colony, as we call these gatherings of moths, indications which to the trained eye show that they have been there one year, two or three or four years. We find the old nests. We find there are very few brand new infestations in our State. That conclusion is not the result of the work of any one gang of 5 men scouting, or of any two gangs, but about 70 men broken up into small gangs, and the story holds good for them all. In other words, the work which the National Government has done to assist us in checking the spread of the moth, not only in Massachusetts but throughout New England, has been in a large measure most effective, and has been, of course, very highly helpful.

I am sorry to say that the work of our scouts shows that the gipsy moth is in New Hampshire. The other gentlemen will speak for New Hampshire and Maine, where the Government has worked both on the line of protecting the highway and also in the way of giving the State expert help in scouting, because the States of New Hampshire and Maine and Rhode Island did not have the trained men. The work in New England shows that we have a much larger problem on our hands than we knew two years ago, but no larger than we feared. I think we may say that our problem in Massachusetts is one-third larger than we knew, and the one in New Hampshire is many times larger than was known, and the one in Maine also. The Government forces can use in New England every single dollar of the proposed appropriation of \$150,000, and if the problem is to be handled, in my judgment, in a thorough businesslike way it would be wise to make a greater expenditure in the next one or two or three years than to appropriate just enough to continue the good work in progress and keep this thing going along indefinitely.

The CHAIRMAN. Can you tell us what progress has been made? How much smaller territory, if the territory is smaller, is now infested by the moth than was infested when the Government work began a few years ago?

Mr. KIRKLAND. I am very glad you asked that question, because that will bring out the point that the territory known now to be infested is larger than that which was known to be infested when the work started, and I should say, from thirteen years' experience in this work, that next year we will very likely have an even larger known infested area. But that is not the real point. The moth does

not spread from the border outward. The spread of the moth has been likened to the spreading of the ripples from a stone thrown into a pool of water; but that is not the way the moth spreads. In these particularly badly infested centers a few years ago you could not drive through the street without picking up the moths on your vehicle or having them drop on your clothing or your hat. By the two years' work we have done there, the State forces and Doctor Howard's forces, we have now a body of trained men available for this scouting work for the first time, and we shall continue that just as long as we can during the winter, and before the leaves start in the spring, and I expect to find eight or ten towns more infested; but we have stopped the spread, because we are wiping out the great big infested centers. We have got matters into such shape in that very badly infested section of Boston that you can drive through the streets at any time, summer or winter, practically without any danger—perhaps 1 per cent of danger—of picking up gypsy moths and carrying them. That was not the situation two years ago.

Now, take it from the financial end. We have spent in Medford, in all, \$26,000, put the money right in there as I am suggesting that you gentlemen may consent to do; in the case of Nashua, we put the money right in there in 1906, \$20,000 in round figures. In 1907 we handled Medford for about \$15,000, and my estimate for Medford this year will be \$10,000 or \$11,000. That holds good for Everett and Chelsea and Cambridge and Arlington and Winchester, and several others, so that we have cut down these badly infested centers to a point where the spreading has been minimized if not absolutely stopped. We have a large area to work over, but it involves less expense. It involves the employment of a smaller number of men. I think that answers the question, does it not?

The CHAIRMAN. Certainly.

Mr. KIRKLAND. We have in Massachusetts 165 infested towns; in New Hampshire 42 towns; 10 or 12 in Maine; 2 or 3 in Rhode Island, and a little colony at Stonington, Conn. I have a map here, which is the property of Doctor Howard's office, taken from the Boston office, which gives roughly the infested sections of New England.

Mr. GILHAMS. You speak of towns. You mean towns or townships?

Mr. KIRKLAND. In New England we do not have the township system. The town or the city is the whole thing. It is a definitely incorporated body politic, having certain definite bounds. I believe in the Middle West or the Western States they have the town and the township?

Mr. GILHAMS. It means 6 miles square with us.

Mr. KIRKLAND. We are a little unfortunate in that respect, perhaps. Six miles square would make a pretty good town for us. I will leave this map for your inspection. If you gentlemen care to see a few photographs of what the gypsy moth does when it turns itself loose, I should be glad to pass these photographs around [exhibiting photographs].

Mr. HAWLEY. Is there any natural enemy of the gypsy moth?

Mr. KIRKLAND. Yes; we have about fifty in this country, native to this country, but none of them amount to much. They amount to

very little. Doctor Howard, if called upon, will tell you more about the importation of parasites from abroad. In Europe the moths are held in check to a large extent by their natural enemies. Several years ago Congress appropriated \$2,500 for the purpose of having Doctor Howard make an investigation of the enemies that hold the moth in check over there, and our State put up \$5,000 for the same purpose, and I have turned that over to Doctor Howard, and there is no man in the country—if Doctor Howard was not here I would say that there was no man in the world—better qualified to do that very technical piece of work than the honorable Chief of the Bureau of Entomology. We have brought over with Doctor Howard's assistance 100 different kinds of parasites of the gypsy and brown-tail moths, and we have a laboratory where they are being bred, and they are being turned loose in our badly infested section, and if Providence is as kind to us as it usually is these parasites will check the moth and reproduce European conditions. But that may be five or ten years away, and in the meantime we must paraphrase that good old hymn of the church, "Watch and Fight and Spray."

Mr. HAWLEY. Do these parasites thrive here as they do in Europe?

Mr. KIRKLAND. It is a little too early to lay down a general statement, but those which have gone through at all seem to be just as happy and contented as they are in Europe, and they are multiplying all right.

If there are not any other questions, I think I will give way to the representatives of New Hampshire and Maine and the other States.

**STATEMENT OF MR. E. P. HITCHINGS, OF WATERTOWN, ME.,
STATE ENTOMOLOGIST.**

Mr. HITCHINGS. Mr. Chairman and gentlemen of the committee, Professor Kirkland has very lucidly, I think, explained the situation in Massachusetts, and in a few words I will state our history in Maine. It has been short compared with that of Massachusetts. I was familiar with the work there during the term of the old commission, between the years 1880 and 1900. We had previous to the gypsy moth invasion what is termed the other pest, the brown-tail moth, and our work was commenced on that, not knowing that we had the gypsy in our midst, in fact, not believing that we had it. The authorities in Massachusetts took the same ground, and so we started on the brown-tail moth work, and for two years were fighting that pest. A year ago last fall I, with others, felt that the gypsy moth was so near that we would be wise to have a survey made, or a scout made, so through Doctor Howard of the Department here we obtained some scouts; in fact, Doctor Howard came personally to the State, he and Mr. Rogers, to look over the situation, and they kindly furnished us with trained men to scout a certain territory from Kittery to Portland, to determine if there were any egg clusters of the gypsy moth. Those men were selected from the trained men from Massachusetts who had been in the business and knew it, and they commenced to find the egg clusters at once. They scouted along the main highways from the border of New Hampshire, from Kittery to Portland, and they discovered a number of infestations, and they also found an isolated infestation at Togus, right out from Augusta, at the National Soldiers'

Home at Togus. That placed us in a position so that we could go to our legislature, two years ago, with a serious proposition on our hands.

We did not realize then to what an extent it would grow. But I will not use that term "grow," for the reason that later developments showed that this infestation we discovered lately was then on the ground. Our legislature appropriated \$30,000 for two years, primarily to work on the gypsy moth, leaving the other pest, the minor one, the brown-tail moth, to the towns to fight; so that last year we had a fund of \$30,000 available for this work. Those infestations that had been located for us by the experts were carefully watched and treated through the summer by our men, and a few under the instruction, of course, of the men that had preceded, and we feel that by the result of that work last summer it is evident that we can do thorough work in exterminating the gypsy if we only had sufficient funds to do it. The infestation covered over 200 of what we call minor infestations. I will simply cite one instance, to show you how gradually the work was carried on. About midsummer an infestation, a new one, was discovered by accident. It was not in the forest, and it was not along the highway where shade trees existed, but it was simply in a pasture land bordering the roadside. One of the scouts in going to his work saw two caterpillars crossing the road, and he got off his wheel and discovered that they were gypsies. They were almost full grown.

An investigation showed that the sweet fern bushes and this ground hemlock in the pasture was where they were. There was quite a lot of it on one side, and the caterpillars had eaten pretty much everything there and were crossing the road for food. There were stone walls on either side of the road. The whole force was gotten together, and 7 barrels of kerosene oil were used in spraying—there were about 7 acres in the pasture—and then the torch was applied; and the odor from burning those caterpillars was like that of burning old horses. We estimated that we had destroyed over a half a million of almost full-grown caterpillars. Careful watch was kept over that section, burlaping the trees and capturing what we could, and this year one of the best scouts from Massachusetts was sent to that section to see how thoroughly that work had been done. With a careful search, covering the whole territory and turning over every rock, he found just one egg cluster. It seems to me that will give you an idea that if we have available force enough we can do thorough work.

Now, coming to the condition this fall, no inspection had been made of the forest situation in Maine, and you know what our forest interest is in Maine; that our lumber industry is one of the most important industries we have. I felt that we needed an inspection made of the forest condition, so we went to Mr. Rogers, who is on Doctor Howard's staff, and asked for more men. They promised to send a certain number to aid us. I asked for more, so that we might make this thorough inspection of the forest. Those scouts in their work have helped us to that extent that I feel we would have been lost, alone; that this Government appropriation has aided us to such an extent that we never can be too grateful for the help it has rendered. We discovered an infestation in a 300-acre wood lot, of about 200 acres infested, and our men have taken about 7,000 egg clusters; and

when you understand that those egg clusters will average from 300 to 500 eggs in a mass, you will see that that means quite an army. We discovered in that infestation evidence that they had been there at least five years, and we had not known it.

The work is being carried on with the Government force and ours assisting, and 50 men or a little more have been working through the winter thus far and they are continuing to extend this inspection through the whole southern section of the State, and we, of course, need that assistance, and we feel that we are justified in asking for more aid. We feel that a dollar spent now would be worth ten another year, perhaps, or in two years—in that ratio—and if this appropriation of \$150,000 could be increased it would be worth more now in the work than it would be in years to come, because we feel satisfied that if the funds are available the work will be effective. You understand, I think, that we have not been able to get trained men before. The man to do this work has to be an expert, just the same as we would have an expert accountant or an expert in any other line of business. A man has got to become trained, and have a trained eye, in order to discover these egg clusters. You would think so, I am sure, if you went into a forest and attempted to find egg clusters without knowing anything about the work. Are there any further questions? I do not wish to take up too much of your time.

Mr. ROBERTS. In your judgment, could a larger sum than the sum mentioned here, \$150,000, be profitably spent by the Government in the next year?

Mr. HITCHINGS. I think so; yes, sir.

Mr. ROBERTS. How much larger?

Mr. HITCHINGS. Of course those who have figured the proposition better, from Massachusetts, or perhaps Doctor Howard, would be better able to state the amount, but I feel that an appropriation of \$100,000 more would not be overestimating it at all. I am very confident that our next legislature will do everything in their power to aid us. In fact, some of you may know that we have had a new office created in the State. A new office was created last year, by the last legislature in Maine, that of State auditor, and our situation is a little different this year from what it was formerly. Before, our unexpended balances of appropriations at the end of the year were carried over. This year it was decided that all moneys should revert to the treasury, in every department of the State, at the end of the fiscal year. I went before the governor and council and stated the situation and showed them the territory infested and explained the work, and, out of all the appropriations in the State, ours was the only one that they allowed to be carried over and made continuing. We had a small unexpended balance before we had found this new infestation. I say a small balance; it was not small compared with our total appropriation for the year. It was about \$8,000 that we carried over. So I shall have that \$8,000 added to the \$30,000 another year, but that will not be sufficient. I know from the work thus far, from the scouting thus far done, that I shall have to burlap at least 10,000 trees during the summer, and that means a force of men sufficient to attend every tree, and we have got to have a force of men that will conscientiously attend to business—that is, we can not have a man who will put an egg cluster in his pocket and throw it out on his way home.

Mr. WEEKS. Do you know how much Maine expended last year?

Mr. HITCHINGS. We had this work and the State inspection of nurseries and everything combined, and we used some \$22,000.

Mr. WEEKS. I mean how much of the Government appropriation was spent in Maine?

Mr. HITCHINGS. I do not know, sir. We had the men, and of course they were sent to us by the general field agent, Mr. Rogers, of Massachusetts, and we have about 30 men on the pay roll of the National Government, and they promised to keep them there if they have the available funds to do so.

The CHAIRMAN. Have you anything further to present to the committee?

Mr. ROBERTS. I would like the committee to hear Mr. Dearbin, who is in charge of Gypsy moth work in New Hampshire.

STATEMENT OF MR. THOMAS H. DEARBIN.

Mr. DEARBIN. Mr. Chairman and gentlemen, this ground has been gone over thoroughly both by Professor Kirkland and Professor Hitchings, and I can only add that our demands and conditions are very similar to those of Professor Hitchings, except that the known advent of the gypsy moth into New Hampshire is more recent, and it has only been in the last few months that we have gotten to work. The aid from the National Government has been very beneficial. Without it I do not think that we could have coped with it at all. Our State, as you well know, is not a resourceful State. We depend largely upon our summer visitors and our timber interests, and both are jeopardized by the infestation of this moth. We have biennial sessions of our legislature, and at the last session we only knew of about four or five border towns which were infested, and they appropriated for the two years \$25,000; not \$25,000 a year, but \$25,000 for the two years. Since that time the known infestation has increased to 42 towns. There is no question but what they were infested before, but we did not know it. The National Government has had about 40 men working in New Hampshire, scouting since September, perhaps, or October.

As I say, we feel that our timber interest and our summer-visitor interest are largely jeopardized by this moth. We have this State appropriation, and of course we can have no more State aid at present. Our legislature does not meet this year, and we can have no more aid from the State until the next meeting of the legislature, and I wish to say that in the distributing of this money to Mr. Rogers, the gentleman who has the work in charge in New England, it has been very helpful, and there are evidently no State lines drawn. I do not think that he considers at all whether the infestation is in New Hampshire or in Massachusetts; he is perfectly willing to help Maine, New Hampshire, or Massachusetts.

The CHAIRMAN. In relation to the amount appropriated by the State of New Hampshire, you say that on account of the legislature not meeting it will be impossible for you to get any State appropriation this year?

Mr. DEARBIN. Yes, sir.

The CHAIRMAN. Has it been the practice in New Hampshire, as Mr. Kirkland said it was in Massachusetts, for private owners of wood lots or sets of municipalities to contribute anything to this work?

Mr. DEARBIN. We have never had any law governing this until the last session of the legislature. This year is the first time that we have had a law. The valuation of our towns is small, and it takes about one-tenth of 1 per cent of the valuation to cope with the brown-tail moth, but we never have had a workable brown-tail and gipsy moth law until just now.

Mr. WEEKS. How much of that \$25,000 appropriation have you already spent?

Mr. DEARBIN. About \$8,000.

Mr. WEEKS. About \$8,000?

Mr. DEARBIN. Yes, and we have got 42 towns which next summer should be burlapped on the lines which Professor Hitchings has set forth, and we certainly do need aid from the National Government.

Mr. HAWLEY. Will this \$25,000 be all that you will have to spend, or will there be voluntary contributions?

Mr. DEARBIN. No; it will be all that we will have to spend until the next meeting of the legislature.

Mr. HAWLEY. When will that be?

Mr. DEARBIN. Next winter; next January.

Mr. HAWLEY. You are not expecting any voluntary contributions or aid from the towns?

Mr. DEARBIN. No; as I say, the one-tenth of 1 per cent which we are entitled to tax the town, with the exception of a few richer cities, just about pays for the brown-tail moth work, and in some instances it does not do that. Then, supposing that the town spends more than one-tenth of 1 per cent, the State reimburses to that town 50 per cent of the excess. Is that clear?

Mr. HAWLEY. Yes.

Mr. DEARBIN. That is all, gentlemen.

Mr. ROBERTS. I would like you to hear, Mr. Chairman, from Colonel Ellsworth, former speaker of the New Hampshire legislature.

STATEMENT OF HON. RUFUS M. ELLSWORTH.

Mr. ELLSWORTH. Mr. Chairman and gentlemen, the ground has been fully covered, and except that I do not want to seem to run away, I would not speak at all, and I will not take more than two minutes of your time. I have no practical knowledge of the work of handling the gypsy or brown-tail moth. For two years past I have hired men and paid from my own pocket for having my own trees cleared of the pest. I live in a border town, a town adjoining Massachusetts, and until very recently we have not realized what the pest meant. We thought that it was largely imaginary, but some of us began to find that it was not an imaginary thing by any means, and two years ago, or last year, they appeared in my town and 3 or 4 adjoining towns, and the National Government has taken up the work, sending out scouts, and we find that instead of 5 or 6 towns, we have at least 42 infested towns, which means that in a year or two, unless the matter is properly handled, there would not be any question but what we would all know that they were in those 42 towns, because the work shows for itself, and that work should be pushed now instead of being delayed while they are allowed to

spread. The condition in regard to our legislature and in regard to our local appropriations has all been explained to you, and I do not know that I have anything to say in regard to it. There are many men like myself in our towns who have expended and will undoubtedly expend money from their own pockets to clear their own grounds; but that is a comparatively small part of the work.

Mr. WEEKS. Do you not think it is reasonable that we should ask, in making an appropriation of this kind, that the States and towns should aid as materially in this work as the Government has been asked to do?

Mr. ELLSWORTH. I think it is entirely proper, and I do not think there is any doubt but what they would do it, only the governor I do not think would feel justified in calling the legislature together for this sole purpose. The expense of a session would be greater than the amount of the appropriation itself.

Mr. WEEKS. The towns could do it.

Mr. ELLSWORTH. They could do it, and so far as the highways are concerned, they are clearing them all out; but private grounds and timber and sprout lands are not cleared.

Mr. HAWLEY. The money they have appropriated in your town was in addition to that assessment?

Mr. ELLSWORTH. They did appropriate a small amount in my town for keeping the shade trees clear. We have a population of 5,000 people. We are especially well provided with shade trees, and the town is well taken care of, and when the appropriation is not sufficient they pay what is necessary; and it will be taken care of and there will be no expense to the General Government so far as the village is concerned. I do not know that that will extend into the outskirts, but certainly not into the forest.

I thank you, gentlemen. I do not want to take up your time.

Mr. ROBERTS. Just one word, if I may be permitted, on the amount of the appropriation. We feel up in New England that the Department has underestimated the necessities of the case, and has not recommended as large an appropriation as should have been recommended under the circumstances, and we trust, when the gentlemen come to consider that item, that if they can do so they will increase that amount. We here in Congress, of course, realize the necessity of rigid economy, and know that all appropriations must be cut down to the lowest possible limit; but in a work of that magnitude we feel that an inadequate appropriation at this time is a false economy, that you will not get as much benefit out of the \$150,000 for the ensuing year as you would if we were to appropriate \$200,000 or \$300,000; that the benefits of the larger appropriation would be more apparent in proportion to the amount you give us. Other than that I do not care to say anything further.

The CHAIRMAN. On behalf of the committee I should like to express the appreciation of the committee of the clearness and brevity with which the gentlemen who have appeared before us this morning have presented their case. As I said in the beginning, the question as to the amount of this appropriation is one that under our regular order of procedure we will consider later. When we come to consider it I am sure that what has been said here this morning will be remembered. If there were any danger of its being forgotten, I should like to say

to the committee of gentlemen who have come in from the outside that the Massachusetts delegation will be very likely to remind us of it.

Mr. ROBERTS. I want to thank you, on behalf of the committee, for interrupting your regular course of proceeding to give these gentlemen a hearing.

The CHAIRMAN. I have a communication from a colleague, Representative McCall, of Massachusetts, transmitting a letter which he has just received from one of his constituents, Mr. Frank A. Cutting, requesting that it be included in these hearings in connection with other testimony relating to the work of exterminating the gypsy moth. Without objection this request will be granted.

The letter referred to is here printed in the record, as follows:

79 SUMMER STREET, BOSTON, MASS.,
January 29, 1908.

MY DEAR MR. MCCALL: I notice from the papers that there is a bill before the committee asking for an appropriation for gypsy moths.

When the gypsy moth first made its appearance on the east side of Middlesex Fells, I did not realize how dangerous a pest it was, and there were very few citizens at that time that really understood the danger. About five years ago I began to realize the danger. I have taken care of my trees faithfully, but do not find that I gain very much, for gypsy moths are hatched in vacant places of land and grass and all sorts of places, and they seem by instinct to know where to find an oak tree and start for it. I put tanglefoot around my trees and killed millions of small caterpillars, the first ones being only one-fourth of an inch in length. I continue killing until they are fully grown, and as soon as I am done with one year's work I start on the new nests. I have a variety of trees on my place, consisting of red and white oaks, walnuts, and pines. Although I put tanglefoot on the pines, it is very seldom that any caterpillars try to go up the pines. They seem to know instinctively that the food that they want is white oak, and that their second choice is red oak. They never trouble a pine until they are practically fullgrown, and then if there is nothing else for them to eat, they will eat pine. They will crawl a long distance on the ground if there are no oaks anywhere near.

I am satisfied that these pests will not thrive to any extent unless they can have oak leaves to thrive on, and that if there were no oaks in this vicinity they would soon die out. There are a good many maples in the vicinity of my residence, but the gypsies never trouble them. White and red oak are scattered through the southern part of New England and these pests are spreading fast into these localities. I am satisfied that the only way that this pest can be controlled and exterminated is by the United States Government, and unless the United States Government appropriates a large amount of money and handles the problem in a scientific manner our oak timber, not only in New England, but in the Alleghenies, will be doomed. Oak timber extends westward through Connecticut and the southern part of New York State to the Alleghenies and all the way south through the Allegheny Mountains. If the pest once gets down into this territory it will be impossible to exterminate it. The only time that the gypsies travel to any extent is when they are about three-quarters grown. If their food gives out they travel on the ground quite rapidly to a new place. There is great danger when the caterpillar is three-quarters grown that it will crawl into freight yards and on cars and go into the cocoon state on cars. Then, of course, the eggs would be laid on the car and would hatch out the following spring, and the car at that time might be several hundred miles away, and thus a new locality would be infected. When in the miller state the female does not fly, but lays her eggs within a few feet of where she is when she leaves the cocoon state.

Individuals can do only a very little in the way of extermination. Towns can not do much more and the State can do only a little better. This problem must be handled by the United States Government and all parts of the United States should bear their part of the burden, for gypsy moths are a menace to the whole country, not to a small section.

The Government can surround the infected region and their authority would be sufficient to accomplish results.

I trust that you will use every effort to have a large appropriation made at once, with full authority to the Forestry Commission to expend the money.

Yours, very truly,

HON. SAMUEL MCCALL,
Washington, D. C.

FRANK A. CUTTING.

COMMITTEE ON AGRICULTURE,
HOUSE OF REPRESENTATIVES,
Washington, D. C., February 6, 1908.

STATEMENT OF MRS. MARY H. ABEL, OF BALTIMORE, MD.

Mrs. ABEL. Mr. Chairman and gentlemen of the committee, I have been asked to present a petition signed by the president and members of the Lake Placid Conference on Home Economics regarding this grant that the chairman has referred to. This conference is made up of men and women who are interested in improving the homes of the country along practical lines, and especially in the nutrition of the people, these ends to be met largely by better teaching in the schools. It is a committee that attends to the educational part, and during the life of this conference, now I think in its ninth year, it has always been in close touch with this work going on in the Department of Agriculture and has made very large use of the publications, especially the free farmers' bulletins that have been issued, and we have frequently sent in requests that this work be continued, or suggesting lines on which it could be beneficially extended.

When this appropriation was cut off, it was a matter of much concern to this conference, and at their last meeting this petition was drawn up and signed. It is very brief, and I should like to read it. [Reads:]

To the House of Representatives:

The officers and members of the Lake Placid Conference on Home Economics respectfully petition the House of Representatives that the nutrition investigations, carried on heretofore in the Department of Agriculture under the direction of the Office of Experiment Stations, may be resumed and continued.

The work which has been carried on in the past has supplied us with information which has been of the greatest value in our work as investigators, as teachers, and as home makers. We have looked to these nutrition investigations for exact information regarding the nutritive value of the varied food products which we purchase in order that the daily food may be adequate and wholesome and at the same time reasonable in its cost in proportion to the total income.

Much information is now available as a result of these investigations, but the problems which await study are also numerous and their solution important. Undoubtedly no one agency has done more to make the average citizen intelligent concerning cost of food and its nutritive value than the bulletins issued from the Office of Experiment Stations. To have them cease just as the teachers and students in the hundreds of schools and colleges had become accustomed to consult them will be an irreparable loss.

We therefore respectfully request the continued aid of the General Government in studying these questions which we are convinced are fundamental and of the utmost importance to the home and upon the right solution of which the health, vigor, and general welfare of our people so largely depend.

ELLEN H. RICHARDS,
Chairman,

MARION TALBOT,
First Vice-Chairman,

HELEN KINNE,
Chairman Teaching Section,

(and 24 other members of the committee).

I should also like to speak, Mr. Chairman, regarding another phase of this work which has been of especial interest to myself. I am a member of the board of charities of the city of Baltimore, and knowing of the work done by the Department, our board asked some two or three years ago that the Government send experts to examine the dietaries furnished to our large asylum, Bay View, where something like seventeen hundred people are taken care of, and also some of our smaller institutions, where children in orphan asylums were cared for. We were very doubtful whether the food furnished was of the proper kind and quality and whether the people were well nourished on this food. We needed expert advice. The Office responded by sending an expert, who examined these dietaries. After a time the results were furnished us in typewritten form, and they were of exceeding value to us. They saved us quite a large sum of money, and we felt sure that people in certain of our institutions were well nourished, and nourished on what we could afford to furnish and the food we could afford to pay for, which was a very great comfort; and in several of the children's institutions we very materially improved their diet. This is now in manuscript, because at the time of its preparation the appropriation was cut off and it could not be published. This very excellent report ought to go all over the country and be read by people interested in charities, who are now in their progress in that line more and more putting their work on a scientific and exact basis, greatly to the aid of the country. I will not take more of your time.

STATEMENT OF DR. GEORGE M. KOBER, OF WASHINGTON, D. C.

Doctor KOBER. Mr. Chairman and gentlemen, I am professor of hygiene at the medical school of Georgetown University and also a member of the Board of Charities of the District of Columbia. As a member of the Board of Charities it becomes my duty in a supervisory capacity to visit about 34 institutions in the District of Columbia and to see that the inmates are properly cared for. The question of food—how to live well and cheaply—is an economic problem of extreme importance both as to the health of the inmates and in the expenditure of public money.

In this work we have received from the Department of Agriculture very important information, especially in reference to the nutritive value of certain articles of food and the amount of food required to keep the human machine in good repair without introducing either an excess or deficiency. You can readily understand how much we regret that the appropriation for this work should have been discontinued, particularly in view of the fact that the data are now by no means complete, and much work remains to be done before we shall know exactly how much food is necessary for different individuals and ages under different conditions of muscular activity and rest. I asked the other day one of the gentlemen connected with nutrition experiments to suggest cheap and yet wholesome dietaries for a man, wife, and three children—a family of five, a family where the head earns \$2 or less a day—and he was unable to give it to us because of the absence of an appropriation.

We wanted this information in connection with our work of the President's Home's Commission, and place it in the hands of an

expert cook, to prepare suitable menus, and say to our poor people in this city and elsewhere, "It takes just so much money to buy the meat, vegetables, and certain other foodstuffs mentioned in these cooking receipts, in order to keep husband, wife, and three children in good physical condition without the least extravagance in money expenditures."

You can readily understand that the money question is an important one for a family of five whose income may be only a dollar and a half or two dollars a day. Many of these people do not know a thing about the nutritive value of different foodstuffs and the judicious purchase of food. Some of our poor people will buy tomatoes, for example, thinking that tomatoes are very nutritious, when they have little or no food value. One of the functions of the Department of Agriculture in the past was to teach the people of this country how to live well and cheaply. I sincerely trust the item may be restored in the appropriation bill. I make the appeal, not only in behalf of the charitable institutions, but particularly in the interest of the daily laborers, who are most likely to be benefited by this kind of experimental work.

STATEMENT OF MISS EMMA S. JACOBS, TEACHER OF DOMESTIC SCIENCE IN THE PUBLIC SCHOOLS OF WASHINGTON, D. C.

MISS JACOBS. Gentlemen, I have charge of the work in domestic science; that is, teaching cooking and how to manage a house, in the District of Columbia. I come to represent the teachers of this science and to ask that this appropriation be made, so that we may first have the investigations—and the results afterwards published—to determine how much food is needed, and the effect of the different agents, heat, water, and the different acids and other things upon it, so that in our work of teaching the children we will have some scientific foundation for our statements. Our work is to teach the children how to do this, and to teach the mothers through the children, and direct them how to prepare the food, how much to prepare, and how much it costs, and how much it costs to serve it.

THE CHAIRMAN. Have you any source of obtaining this information except the bureau? Is it not furnished in text-books?

MISS JACOBS. No, sir. There are no reliable text-books that furnish it. This is a new science and a new work. It must be done by a larger body than a school, or than the few men and women interested in it. It costs money, of course, and we have no other means of obtaining it. The matter in the text-books that do exist is not correct, and we are waiting for the Department of Agriculture to determine what should go into the text-books. What is believed to-day is disproved to-morrow from experiments, especially what the effects of different agents would be on the different foods. Take, for example, the proteids of meat: High temperatures and other things affect its nutrition and nutritive value and its power to nourish the human system. We need these investigations to spread that information among the teachers so that we may do our work more effectively throughout the country.

I am from Washington, but the teachers all over the country are doing and asking the same thing. They want more of the technical publications, those that are based upon definite experiments, so that

we may formulate the teaching of the cooking of food, because on the cooking of the food depends its value in large part as a nutrient. We know that the cooking affects the food material for better or for worse.

Mr. WEEKS. Do you think if the Government made experiments and prepared a text-book that that would be sufficient, so far as the Government appropriations are concerned?

Miss JACOBS. It would require considerable experiment, I think, even to get the information which should go into the text-book. I do not know whether the Government could send out a text-book. I think these publications take the place, in large measure, of the text-books. We base our teaching on the information there given.

Mr. WEEKS. If there were such a text-book, there would be no reason why the local communities and States should buy them when the Government furnished them?

Miss JACOBS. No. But what we need is authoritative information.

The CHAIRMAN. Miss Jacobs, domestic-science courses have been a part of the curriculum of all the agricultural colleges throughout the country and of many other schools for a great many years before this work was undertaken by the Government at all. Had they no text-books?

Miss JACOBS. No, sir. They began with just the knowledge that the woman that went into that agricultural college had from home—with just the knowledge that she had picked up at home. In fact, that is just the way I started in with the work in Washington—the way my mother taught me. But I have changed many of those methods after learning the results of investigations.

The CHAIRMAN. The only reliable scientific work and research work that has been done in that line has been in connection with this Department?

Miss JACOBS. In this Department and in the agricultural experiment stations, which come under this Department. Of course in other countries, in Germany, for example, such experiments are carried on by various agencies, but in this country I think it is all under one head, and when the appropriations are cut off, of course the experiments must stop and the bulletins must stop.

Doctor KOBER. To emphasize the importance of continued experiments, let me say that for years we believed that 118 grams of proteids taken into the system would be sufficient to repair the waste of an average adult weighing 154 pounds. Professor Chittenden, of Yale, three years ago, after a long series of experiments with the Yale students, found that really only 55 grams of proteids are required to rebuild the several parts of the human machine that are broken down in twenty-four hours. Most scientists do not accept these estimates as at all correct, and further experiments are absolutely required to reconcile conflicting theories and to establish whether Professor Chittenden's estimates are correct or whether the estimates formerly made should obtain. You can see it is a great economic question to determine whether we should introduce 55 grams or 118 grams of proteids into our systems in twenty-four hours. It is not only a question of dollars and cents, but a question of the utmost importance to health. The moment we introduce more food than is necessary into the human machine harm will result. We are very careful not to introduce more fuel into furnaces for the generation of force in other machines than

is necessary; but in the human machine no attention is paid to this matter, and it is believed that sooner or later disorganization results from the introduction of too much food into the system. It will require two or three years of investigation to determine whether Professor Chittenden's conclusions are correct or not, and it is exceedingly important and desirable that the truth should be known. For that reason, if for no other, we think that these experiments should continue.

The CHAIRMAN. I will say to Mrs. Abel, Miss Jacobs, and Doctor Kober, in behalf of the committee, that the committee have been very much pleased to hear what has been said by them and that full consideration will be given to it when they come to consider the bill.

COMMITTEE ON AGRICULTURE,
HOUSE OF REPRESENTATIVES,
Washington, D. C., Wednesday, February 6, 1908.

The committee met at 2 o'clock p. m., Hon. Chas. F. Scott, chairman, presiding.

Present, Dr. Alonzo D. Melvin, Chief of the Bureau of Animal Industry, Agricultural Department; S. H. Cowan, esq., Murdo Mackenzie, esq., Wilfred Linton, esq., and others.

The CHAIRMAN. Gentlemen, in accordance with the arrangement that was made some days ago we have met this afternoon in order to hear from some of our colleagues who are interested particularly in the appropriation for the continuation of the work which has been carried on for the past two years in the hope of exterminating the cattle tick. I understand my Ransdell, of Louisiana, to be the spokesman for the delegation; and I will present him to the committee, and ask him to present his other speakers in the order in which he would like to have them heard before the committee.

**STATEMENT OF HON. JOSEPH E. RANDELL, REPRESENTATIVE
FROM LOUISIANA.**

Mr. RANDELL. Mr. Chairman and gentlemen of the committee, you are kind enough to introduce me as spokesman. I do not know that I have very much to say, Mr. Chairman. I had hoped that we might have had here some agriculturists from various parts of the South who could give really definite and beneficial information on this subject. But I suppose that the various Members of Congress can give you gentlemen a little idea of this great work; and you had very full hearings on this subject, as you recall, Mr. Chairman, two years ago, which have been published. To the new members of the committee, who did not have the privilege of hearing the very interesting statement made here by a number of southern agriculturists two years ago, I will say that I am sure that when you go to make up this bill it would be a good idea for you to examine the statements of the various gentlemen who were here on that occasion.

The CHAIRMAN. In that connection, Mr. Ransdell, I might say for your information, and for the information of others who have not been in attendance upon the meetings of the committee, that some three

weeks ago we had Doctor Melvin before us, and inquired in considerable detail as to the progress of this work: so that the committee is fairly well acquainted with it.

Mr. RANDELL. Yes. Now, Mr. Chairman, I would not attempt to make a speech on an occasion of this kind. This is a technical subject, and one that I confess I do not understand very well; and I do not believe any of my colleagues understand it very well. It is a matter in which the entire South is greatly interested. I remember well that the statements of Doctor Melvin and others of the Agricultural Department two years ago were to the effect that in round numbers the South suffered an annual loss of about \$67,000,000 from the ravages of the cattle tick. Some of the Southern agriculturists, among others Doctor Mayer of my own State, place that loss at \$150,000,000. We are beginning to suffer terribly in many parts of the South, as you gentlemen know full well, from the ravages of the boll weevil. In my immediate section many people think that you can not make crops successfully on account of the boll weevil. On the rich, humid lands of the Mississippi Valley they say you can not contest successfully with the boll weevil. We must do something else, and we believe it is thoroughly demonstrated that cattle raising in the South can be made quite a success; but we do not believe that it can be made a success in the presence of the cattle tick.

This work (which, if I understand correctly, was inaugurated some years ago by the Agricultural Department) has been carried on in a magnificent manner. I know that the people of my own State, where the work has gone on for just one year, in only two parishes, are very much pleased with it; and the State of Louisiana is cooperating with the Government to the very best of its ability and is disposed to continue to cooperate. This work, as I understand it, is purely an educational one. We do not believe that the farmers can be educated by means of bulletins or any published documents that are sent out; but that in order to impress them with the necessity and great advantages of this work, it is necessary to send demonstrators into the fields who will go among these farmers and show them just what to do and how to do it.

The work is entirely educational. We do not ask this great Government of ours to go into the States and do what the States can do for themselves. Not one of us wants that. But we do want the Government to help to educate our people, to help them to eradicate this terrific pest; and we believe that if it can be eradicated every citizen of the Union is going to receive a benefit. At the hearing two years ago it was conclusively proved that every pound of beef from the South was worth from one-quarter to one-half a cent per pound less than that from the North because of the cattle tick.

There is one gentleman here who is in the cattle business in the South, a Member of Congress; and he told me no longer ago than yesterday that he was exceedingly anxious to buy a number of fine blooded cattle in the North, and to take them to his own southern farm, but that he was afraid to do it; that he had done it in some cases, and had lost very heavily by doing it. Mr. August Mayer, from my own State, testified before this committee two years ago that he had spent \$10,000 one spring bringing in cattle from the North, and that the larger portion of them were lost because of the cattle tick. Now, sir, anything which is going to raise the value of

the meat of all the cattle of the South from one-quarter to half a cent per pound I say is going to benefit a very large part of the American people; and I further say, Mr. Chairman and gentlemen, that if we can eradicate this cattle tick and can turn into the business of cattle raising a very large portion of our Union—perhaps a third of the Union—which can not go into the business now, it ought to reduce the general price of beef to all the consumers in the land. And the average American citizen, as we know, is a beefeater. He is not a beef raiser; and he certainly ought to be interested, and very much interested, in anything which is going to give him cheaper beef.

Now, Mr. Chairman, one of the bills that you have under consideration is a bill introduced by myself, asking \$500,000 for the continuation of this educational and demonstration work during the next fiscal year.

Mr. POLLARD. Is that for the cattle tick alone?

Mr. RANSELL. Yes, sir; for the cattle tick alone. I understand that the Secretary's estimates call for \$150,000; and I was further informed that Doctor Melvin told you gentlemen about three weeks ago that he could use \$300,000. The Doctor, as we all know, is a magnificent man, but he is a very modest man. We think he could use more than \$300,000; and we are here to ask you to give us more than that if you can, but certainly the full amount which the Doctor says he can use. I am satisfied that if he has used it everywhere as he has used it in Louisiana he has not spent one dollar unadvisedly. I do not believe that this great Government of ours spends in any of its appropriations money which reaches the plain people of the country in a more beneficial manner than the money appropriated in general terms by this committee, and especially that part which for the past two years you have been appropriating for the eradication of the cattle tick. I am convinced that if you carry on this work a very little while longer you will do as the Secretary told you two years ago, when he said that if you would give him plenty of money he would drive the cattle tick into the Gulf of Mexico. It can be done, gentlemen; there is no question about it. It is only a matter of money.

I will not trespass longer on your time. I ask to introduce now Congressman Legare, of South Carolina.

**STATEMENT OF HON. GEORGE S. LEGARE, REPRESENTATIVE
FROM SOUTH CAROLINA.**

Mr. LEGARE. Mr. Chairman and gentlemen, I simply wish to give my own experience in regard to this tick, and to say that I understand your committee is anxious that this appropriation shall continue; but we want to urge that you make it as large as you possibly can. In other words, if this thing is to be done it ought to be done in the right way.

I want to say, first of all, that the Dairy Bureau of the Department of Agriculture is doing a great work down in our section. It has revolutionized the business in certain parts of my State, especially in the vicinity of Charleston. Some two years ago we had an epidemic of typhoid fever there. We had, I think, some six or eight hundred cases of typhoid fever in the city of Charleston at one time; and

Doctor Melvin sent one of his experts there, and before he got through the typhoid fever had been traced to the milk supply. To-day our milk laws have been revolutionized, and the whole business has been revolutionized. In other words, I am saying that this especial bureau of the Agricultural Department is doing a great work in our neighborhood, and that whatever appropriation you give to them I believe will be well expended, and expended in such a way as to give us vast benefit.

In regard to this tick, I will say that I am in the cattle business myself. I have a large herd of Holstein cattle. I want to call the committee's especial attention to the fact that this appropriation is just as important to the gentlemen of the North as it is to us of the South. Possibly it is just as important, and perhaps more so, when you come to the breeding of fancy cattle. For instance, I have certain strains of cattle in my herd of Holsteins. If I want to purchase a heifer of a certain breed I have to take a risk. I may spend possibly a thousand dollars to get that special animal down there, and after I have had her there for a few months she may take this Texas fever and die. I have seen a bull brought from the North at an expense of a thousand dollars and die in two weeks after he got there. I have seen another one purchased down there and delivered in Charleston, at an expense of \$2,600, and die after he had been there six or seven months. We can not possibly import these fancy cattle from the North without taking a great risk. The bull that heads my herd now was purchased from Gillette's herd in Wisconsin at a cost of \$400; but he was purchased when he was a calf. I got him from the man who brought him out, and he had to bring him out and wait until he became of service age before he was of any account.

The CHAIRMAN. Has it not been known for a good many years that that was the only safe way to introduce Northern cattle into this region?

Mr. LEGARE. The only safe way in which to introduce them is to introduce them when they are small. Some years ago, for instance, I thought I would raise a few of the Herefords. I purchased a bull from beyond the tick belt, and a cow and a heifer; and she calved shortly after I got her there. At the end of twelve months I did not have any of the three left; and they were inoculated before I bought them. They have an idea—and it is good to a certain extent—that you can inoculate these cattle with the tick serum before they are imported, and very often that does all right; but it is not sure. In my instance it was absolutely no good. I lost the three, and all that I had left was the calf, which was born after its mother arrived in my section.

The reason I say that this appropriation ought to be made large is so that the Department can do this work and do it right, Mr. Chairman—not in a half-way manner. Summer before last I needed more cattle in my dairy—milch cattle, to increase the output of milk. I was in the town of Pickens for several months, up there in the mountains; and I knocked around and picked out, off and on during the summer, good milch cows that would calve in the fall, so as to have them taken down in the fall of the year. I purchased 19—just a comfortable carload, we will say; and they were cattle that I paid good prices for. Some of them were thoroughbreds, but most of them were grade cattle. And mark you, in picking out those cattle I took

all the care that I possibly could to get cattle that I thought were in pastures where they had the tick. I suppose you gentlemen understand that if a cow has been bitten by a tick—in other words, if she has been inoculated, so to speak—she can be carried into a tick section. I saw the tick on a good many of these cattle that I purchased, and thinking therefore that all of the pastures in that section, at some time or other, had ticks, I purchased these 19 cows. Five out of the 19 lived after they got home. I lost 9 outright; 5 of them aborted, and were practically no good to me for a couple of years; and out of the 19 I got 5. And as it always happens, they were possibly the meanest 5 out of the 19. Practically the whole 19 were worthless to me, because 9 died and 5 were little or no good; and I really got only 1 good cow out of the 19.

Mr. POLLARD. May I ask a question, Mr. Legare?

Mr. LEGARE. Yes, sir.

Mr. POLLARD. I do not want to interrupt you, if you want to make a continuous statement.

Mr. LEGARE. No; I am just telling my own experience.

Mr. POLLARD. I wanted to ask you whether you had tried ridding your pastures and your corrals of the tick, and then bringing cattle in from outside of the tick belt and trying to raise them under those conditions?

Mr. LEGARE. I am glad you asked that question, because it is very important along the line of my argument to show the necessity for a large appropriation—that they must do this thing thoroughly. Let me explain that to you.

I have some cattle there that I would not take \$2,500 for, Holsteins, cattle that have made fine records. I would not dare eradicate the tick from my own pastures in my section; because at the end of some three to four years (I believe that is about right, Doctor Melvin) the inoculation wears out, and then there is danger of those cattle getting the tick on them again. In other words, it is something like the way you inoculate a man for smallpox. The physicians, I believe, claim that at the end of seven years you have to inoculate again; that the inoculation wears out, and that the person is no longer an immune at the end of seven years. Now, if cows are raised in a tick section and are bitten when they are calves, they have the tick fever, they say, slightly, but you do not notice it when they are very young. When they are about a year old my experience has been that they stand a chance of getting over it, and even when they are 2 years old they stand a chance of getting over it; but after that time I have never seen them recover. I suppose I have seen over a hundred of them die, but I have never seen one of them that was bitten after it was several years old that has ever gotten over it. If they do, they are simply wrecks.

What I was going to say is this: At the end of three or four years that inoculation wears out. Now, I have got an expensive herd of cattle. I have a valuable herd of cattle, with ticks all around me. It is all right as long as there are no ticks there, but if at any time I buy a cow and bring it in with these ticks on it, or if any other animal brings ticks in there (and other animals besides cows bring ticks in), one large tick dropped in my pasture would possibly breed a million others, and I may lose my whole herd. Therefore, while I can do it, while I can rid my own pasture of ticks (it is all under

fence), I do not dare do it. I have possibly 3,500 acres of land; but I could rid my cattle pastures, where I keep the cattle, of the tick in little or no time. I do not dare do it, however, because there are ticks all around me, and at any time a cow from the outside may get into my pasture and drop a tick there, or some other animal from the outside may bring a tick in and drop it there, and that tick would breed possibly a million—I believe they have known 3,000,000 ticks to come out of one—and it may ruin my whole herd. Therefore I am obliged, strange as it may seem, as a matter of protection, to keep ticks on my cattle. I want to say that every year I go around among my cattle and look at them and see that they all have a tick or two on them.

Mr. McLAUGHLIN. And if they had not, you would put one on?

Mr. LEGARE. And if there was not I would put one on them. So that no year passes without my knowing that there are ticks in my pasture, strange as it may seem.

If this thing is done, I want it done thoroughly; because as you lower that belt you are practically cutting me off, for instance; and I want it done thoroughly and want it done as soon as possible.

The place where I bought these cattle that I spoke of, for instance, is right in the neighborhood of the tick line, in Pickens County, in the upper part of the State. Right in that neighborhood some pastures had no ticks; and there is where I was fooled. Some pastures had no ticks; others had ticks. Some people had eradicated the ticks from their pastures. Those five cattle that had ticks on them when I bought them were all right; but the rest of them had not. They were bought right in that neighborhood, where it was half-way done; the belt had not been moved beyond that point, you see; and there is where I was fooled. I thought all of those cattle had had ticks on them, and when I brought them home I found that only five were immune. The rest of them, the minute they got in my pasture, picked up ticks, and they died. And I have seen, gentlemen—it may seem strange, and for a long time I could not understand it until it was explained to me, and until I made a thorough study of it—I have seen cattle come off a train and stagger as they came off the cars with this tick fever on them, simply because those cattle cars were lined with little, fine ticks (too fine, possibly, to be seen with the naked eye), and the cattle got the ticks on them the minute they got on the cars.

As a rule, my experience has been that if the ticks get on cattle they die within twenty-four to forty-eight hours if they have a severe attack. I have seen them linger, of course, for some length of time, but not get over it. Around the cattle lot in my town I have seen droves of cattle come from Tennessee, a carload of them, and the butchers would buy them and divide them up and take them to their pens; and a butcher would ask his headman: "What cattle shall I kill this afternoon?" And he would say: "Kill those that look the sickest." Half the time when cattle come in off the train from beyond the tick belt my people are eating diseased cattle. In other words, the butchers are not going to let the cattle die on their hands; and the man will go to the pen before he kills in the afternoon, and he will pick out those that are a little droopy. You can tell the minute they begin to get the fever by the droop of the head and the glaze of the eye, etc.

The CHAIRMAN. What has Doctor Melvin to say about that?

Mr. LEGARE. I do not know whether the doctor has ever had a chance to look into that matter; but that would not come under the head of interstate commerce, and I do not suppose he could tackle it anyhow.

Mr. POLLARD. I thought you said they came from Tennessee.

Mr. LEGARE. That is true; but after they got off the cars and got there the police laws of our State alone could govern them, you understand.

Mr. RANDELL. They are only fed to the South Carolinians, are they not?

Mr. LEGARE. They are only fed to the South Carolinians, and the Government could not handle the car after the delivery, you know. The interstate commerce power, of course, would only affect them until they got to the destination. After they are delivered the Government can not exercise the interstate commerce power over them any more. They would then become subject solely to the police laws of the State.

But I have heard the butcher tell his man: "When you butcher this afternoon I want five beeves," or "eight beeves; and pick out those that look the sickest." And I have seen them driven as they came off the train, droopy, and hurried up to the cattle lot and the butcher pen to be killed before they got so that they would go down and could not get up again. And then I have seen other things, too. During our exposition in South Carolina I saw a man from the upper part of my State who had a herd of Jerseys there—as handsome a herd of Jerseys as I have ever seen in my life, from Smyth's herd there. You know of that herd—the Hearst herd. He brought those cattle there, and just as he was taking them away they got sick. They had been there in the winter time, and when they were loading them onto a train some of them got sick, and he lost several of his very best animals. He lost one bull that he had imported from the old country, simply because a warm spell came along, and the ticks got to moving about, and one or two of them got on these cattle, and they killed a few of them. At that exposition there were herds of elegant cattle from different parts of the country. Fortunately he was the only man that was hurt to any extent. The exposition was held during the winter time. But nothing in the world killed that man's cattle but the tick.

Mr. POLLARD. What is South Carolina doing in the way of assisting the Government in this work?

Mr. LEGARE. That I do not know. I do not think they are doing anything. I do not think, as a matter of fact, that there are fifteen people in the State that know anything about the tick business, although they see their cattle loaded down with ticks. I do not know; Mr. Lever can tell you more about that.

Mr. LEVER. In that connection I will say to the committee that the State is spending about \$1,500 this year in cooperation with the Government, as I got the figures from the Department; and we have recently passed an act of the legislature, at the last session of the legislature, enabling the State to cooperate with the Federal Government. So that the State, as a matter of fact, is very much interested in the proposition, and is doing some work; and we are now making an effort, at this session of the legislature, to appropriate \$10,000 for

this purpose; and I am hopeful that that bill will pass. I think it will pass.

Mr. LEGARE. I am glad to hear that. Of course, Mr. Chairman, as I say, I am not familiar with what the State is doing. I do not know; I can not say positively, of my own knowledge, that there are fifteen men in the State who understand this tick business. I am only giving my own experience, and going on to say that it has gotten to that point that I have simply cut out purchasing cattle from elsewhere. From time to time I have noticed, for instance, a great butter record in Mr. Gillette's herd up in Wisconsin, and I have wanted to purchase; or in the case of Judge Madison's herd, of Syracuse, N. Y., I have noticed a good milk record, and I have wanted to purchase, so as to improve my strain. You know there are different strains of these cattle. But I have been afraid to do it, and I have had to give it up. In other words, as it stands now, the market that the North would have in the South for its first-class cattle is cut off. I get inquiries from Guatemala and Cuba and around about; different people write to me to know what I will sell so many of my Holsteins for, naming the strains and all. They wish to purchase North, but they are afraid to, because of this cattle tick. I can not sell, because I have not more than about sixty thoroughbreds, and I want more than that. While I have about a hundred head of cattle on my farm, I have only about 60 thoroughbreds, and I am trying to increase the number; but I am cut off from doing so now, for the simple reason that I have tried it often, and with such disastrous results. I have two bulls heading my herd now, and I am bound to stick to those and use them to cross back and forth; and the market that the North would have in the South is absolutely cut off, because we take too many chances if we buy their cattle.

In order to do this thing and to do it thoroughly, you must make a large appropriation, or the Department can not act. I do not know exactly how much they want, or how much they require; but I think that you can safely take Doctor Melvin's judgment in the matter.

STATEMENT OF HON. E. S. CANDLER, JR., REPRESENTATIVE FROM MISSISSIPPI.

Mr. CANDLER. Mr. Chairman and gentlemen of the committee, I shall detain you but a very few moments on what I have to say.

I was requested by the people interested in cattle breeding in Mississippi, who have recently formed an organization for that purpose, to appear before the committee at any hearing that might be held in order to express their interest in the subject now under consideration. I remember very distinctly, of course, the hearings which were had two years ago before the committee; and I was impressed with the importance of the subject at that time. It was shown conclusively at that time that for cattle to be raised on one side of this line which is drawn across the country, known as the quarantine line, and for cattle to be raised just across on the other side (one being divided from the other simply by this quarantine line), that of itself made a difference in the value of the cattle of from one-quarter to

one-half a cent a pound; and that was sufficient to attract attention to this subject and show the importance of it.

I remember that one gentleman who appeared before the committee at that time mentioned an actual occurrence that came under his observation, where cattle were raised within half a mile of each other, according to my recollection, or within a very short distance; anyway, one on one side of this line and one on the other. They were both sold at the same place, weighed about the same, had about the same treatment, had practically the same appearance, and all that, and still the difference in the value of those two animals was, I think he said, half a cent a pound, according to my recollection; not less than a quarter of a cent a pound, I am sure.

There is a bill on this subject now pending before the legislature of the State of Mississippi which I had prepared and sent there, and which will be adopted, I feel sure, at this session. Since this work has been begun we have not been able to cooperate with the Government, for the reason that the State up to that time had taken no action on the subject, and our legislature had not met until this year, I believe, since this first appropriation was made. But a bill is now pending before this session of the legislature for the purpose of co-operating with the Government in this very line of work. They have an organization in the State that is taking a lively interest in it; and a number of its members talked to me personally this summer in reference to it, and called to my attention the great importance of it, and how it affected our country. That work is just being begun there. While they feel the importance of it and the necessity for it, still I will state that up to this time, as I stated a moment ago, they have not taken it up; but by reason of the fact that the work was being done at other places, they are now taking a lively interest in it, and are pressing it upon our legislature.

As was stated by Mr. Legare a moment ago, the importance of it is shown by the very point that he made, that it cuts the northern market off from us, because we can not buy from them and introduce their cattle into our country (although a great many of our people would be glad to do so), for the very reason that the cattle, if brought there, are sure to take this fever and almost certain to die. I remember that a number of years ago, when I was a boy, a man in the county where I was raised brought from across the line a very fine Durham bull at very great expense. He was a beautiful animal, and attracted a great deal of attention; but he did not live long enough to do any service, for the reason that the ticks soon got hold of him, and he had the fever; and he went to that place from whence no traveler has returned—not even cattle. Hence not only the South, but the North, and every section of the country, is interested in this subject; and every section of the country will be benefited by this appropriation. It will not simply benefit one section to the detriment of another; it will benefit all alike; and when we consider the fact that this quarantine line goes clear across the country, I believe, with the exception of New Mexico and Arizona, does it not, Doctor?

Doctor MELVIN. Yes, sir.

Mr. CANDLER. You will see that a small amount of money spent in trying to eradicate this tick and to protect this line which extends clear across this vast territory will be simply wasted.

Mr. RANDELL. It reaches to the Pacific.

Mr. CANDLER. Yes; it reaches to the Pacific. It requires a sufficient amount to do the work, and to do it effectively, and to protect this line effectively, to accomplish any good whatever. Hence the importance of a sufficient appropriation to meet the necessities of the case—a sufficient appropriation to do the work which Doctor Melvin says can be done. I believe that the Department ought to have the amount of money that they can judiciously and beneficially expend, and that it is economy to make an appropriation of a large amount rather than to make a small appropriation which will not be used effectively, and the result of which will be that the work will simply have to be done over at some time in the future. Hence I would join with the others in impressing upon the committee the importance of making the appropriation sufficiently large that the work may be effectively done.

I thank the committee for its attention.

**STATEMENT OF HON. THOMAS HACKNEY, REPRESENTATIVE
FROM MISSOURI.**

Mr. HACKNEY. Mr. Chairman and gentlemen, I appear here at the special request of Doctor Lucky, State veterinarian of Missouri, who could not be here himself. I can not speak with much detail as to the work in the south. I know, however, that Missouri is very much affected by this tick proposition—somewhat more, I suppose, from the preventive standpoint, in keeping it away from us, than from having it in our midst.

The CHAIRMAN. Missouri is entirely north of the quarantine line; is it not?

Doctor MELVIN. Some parts of it are.

Mr. HACKNEY. The lower parts of the State I know have had the tick. As far as our section of the country is concerned, I remember very well that Doctor Lucky came down and prosecuted one of my clients and convicted him for having some of his cattle on the highway that were affected with ticks. But our State, like the other States somewhat to the north, feels a great interest in this matter. I know from talking with the cattlemen in my section of the country that they all feel a great interest, especially in keeping the tick away from them, and giving them a market for their own products in the south, as well as in getting a chance to bring cattle from the south to our borders. Of course we are interested in seeing the tick eradicated. If it is eliminated in Texas and Oklahoma and Arkansas, we can probably handle it very easily in our section. Our veterinarian tells me that he uses a large part of the appropriation that is made annually for his department in enforcing this quarantine, and in helping to eradicate and keep out the cattle tick. So our people feel a direct interest in the appropriation being made; and, as he says—I speak in his words—the appropriation ought to be made large enough to thoroughly equip the Department of Agriculture to take hold of this matter in the right way, and effectively. The work is not being done for this year, but it is being done for the future.

Those are the points that Doctor Lucky asked me to bring to the attention of the committee in behalf of the State of Missouri.

I will not detain you any further, because I know that gentlemen are here who have more ticks on them than I have. [Laughter.]

STATEMENT OF HON. WILLIAM B. SMITH, REPRESENTATIVE FROM TEXAS.

Mr. SMITH. Mr. Chairman and gentlemen of the committee, I do not know that I can add much to what has already been said upon this subject. There has been thoroughly demonstrated to the committee, I presume, the great damage that the Texas fever tick does to the cattle industry below or south of the quarantine line. The damage resulting directly and indirectly to the cattle industry of the south has been variously estimated at from about \$60,000,000 to \$150,000,000 annually. I know that down in my State the price of cattle below the line is anywhere from two to five dollars per head less than above the line. Cattle below the line can not be shipped north of the line except for immediate slaughter; and just at this time the restrictions that are put upon the free movement of cattle work a peculiar hardship upon the people of Texas, and will in the future, for the reason that it has come about that there is no outlet for pasturage for our oversupply of cattle south of the line. The opening up of the State of Oklahoma has prevented the securing of pasturage up in that section, that the people south of the line, in Texas, have heretofore enjoyed; and there is no way of marketing the cattle south of the line outside of supplying the local markets, except to ship for immediate slaughter.

The Secretary of Agriculture states in his last report that during the last year he has, by this process of tick eradication, released something like 60,000 square miles of territory; and he states emphatically, from his experience in this work, that the tick can be entirely eradicated from the country, so that these quarantine restrictions and the damage that results from them may be entirely dispensed with. If that be so, \$300,000 a year, or \$500,000 a year, is a very small amount to expend, considering the great loss that results from these quarantine restrictions; and it seems to me that as it has been demonstrated that it is entirely feasible to do this work and to entirely eradicate the tick from the country, this committee ought to be willing to make a very liberal appropriation to carry on the work.

My State has cooperated to some extent with the Agricultural Department in the work there, but I am not advised as to the amount of it. I am satisfied, though, that Texas has not done her full share in the work; but I believe that from now on she will.

I believe, gentlemen, that that is about all I care to suggest to the committee.

Mr. RANDELL. While we are speaking of Texas, Mr. Chairman, I understand there is a gentleman here from that State who is peculiarly well informed on the subject. I will ask Judge Cowan to say something to us. I understand that he represents the Cattle Growers' Association of Texas, and probably is as well informed in regard to that subject as if he were a scientist rather than a lawyer.

STATEMENT OF S. H. COWAN, ESQ., REPRESENTING THE CATTLE GROWERS' ASSOCIATION OF TEXAS AND THE AMERICAN NATIONAL LIVE STOCK ASSOCIATION.

Mr. COWAN. Mr. Chairman and gentlemen of the committee, I did not know I was going to have the pleasure and the honor of addressing this committee; neither did I know that you had before you the subject of ticks. We are peculiarly acquainted with that subject, many of us being fishermen down in that country; and that gives a man a very close acquaintance with ticks, as some of you may have ascertained if you ever went fishing down in that section.

We are trying to stamp out the ticks. The question has just been up in Oklahoma, and is still up, as to whether or not the State of Oklahoma shall make a quarantine line at the Red River. A part of Oklahoma is in a country which is the natural habitat of the tick. A part of Oklahoma which has become stocked with ticks by southern cattle coming north and stocking the country was many years ago free from the ticks. I had occasion some years ago to take the testimony in a lawsuit involving damages on that subject; and the proof showed that in the northern part of Oklahoma, before the building of the railroads running north, there were no ticks, for example, in the Osage country; but at the time we took the testimony the Osage country was stocked with ticks, and the quarantine line was on the south line of Kansas. The result of that was that men who owned cattle in the Osage country could only ship them to market for immediate slaughter, and they could not carry them up into Kansas or elsewhere for the purpose of feeding them on corn or otherwise preparing them for the market. Neither could a man in Iowa or Illinois, or New York, for that matter, if he wanted to do so, buy cattle from that district and ship them to his own country for the purpose of feeding them, because they would carry the ticks and infect the cattle in the given districts where they would be susceptible to the disease.

If nothing has been said to you upon the subject, I would like to make a remark or two about the Texas fever from a practical standpoint. It is this: Animals which have been raised in the infected area are immune from the disease. They are not diseased themselves; they are simply immune from it; and the animals in the susceptible districts take the fever by virtue of the young tick getting upon them and setting up a circulation. The tick punctures the hide and sets up a circulation, and injects the virus into the animal, much as it might be done by a physician pumping virus into any of us and setting up a disease. That is the only known means whereby the fever may be communicated. So if you prevent the tick from being raised, if you prevent the tick from hatching out, you are free from the disease. And so it is that thirty or forty years ago, before the building of the north-and-south railroads, there was never known a case of Texas fever above the Kansas Pacific Railroad, as it was then called. The reason for that was that the tick becomes fully grown in three or four weeks, and falls off the animal; and in the course of driving the animals from the southern Texas area the ticks would fall off, so that the cattle would get there free from the ticks; and when they fall off the old hull bursts open, and 2,000 eggs or such a matter hatch out; and

the young ticks crawl up on the blades of grass, and as the cattle come along they get on their legs, and so the tick infests the cattle and starts up the fever. The whole course of the disease and its propagation is involved in the life history of the tick.

If we can exterminate the tick—and we can not do that by hunting him with dogs, or spreading poison for him, or anything of that kind—if we can exterminate the tick we will have a country that is free from Texas fever, and the cattle grown there can go to the markets of the world. It is a fact that the former chairman of this committee ships cattle from the Panhandle of Texas to New York State, and feeds them there. It is a fact that there is a very large business of shipping calves from Texas to points in Iowa. For instance, at Davenport, Iowa, they hold sales where they sell calves at public auction to be taken out by farmers and fed. So the people of Iowa and Illinois and all of the corn-growing States are just as much interested in the extermination of the tick as we are, because as you exterminate them you increase the field to which they may go to purchase the cattle that they take up to feed on the corn.

We put the quarantine line through Texas by consent of that State. The Government could not have established a quarantine line through the State of Texas except by consent of the State. It runs about midway through the State. You probably have seen maps showing it. They first established that quarantine line on the south side, so that it would throw all of the known tick area below the line. Then they established a neutral zone in many counties, so that there would be a string of counties sometimes as much as two counties wide, say 50 or 60 miles south of the line, which was quarantined against the country even south of that—a local quarantine, established by the State authorities and administered by them in connection with the Bureau of Animal Industry. Now, within that zone the State of Texas and the Bureau of Animal Industry have done a great deal in stamping out the disease (as we may call it) by preventing the country from being restocked with the tick by cattle coming from the south.

That is to say, take the county from which Congressman Smith comes. It has been under the special quarantine, which means that it is quarantined against the country south of it, but the country north of it is in turn quarantined against it, so that cattle can not be brought into Mitchell County—at least, it was that way for a long time, and I presume it is now. Cattle can not be brought into Mitchell County now from the south, nor carried out of Mitchell County to the north. The object of that is that that county is so high in point of elevation and so unfavorably situated for the breeding and development of the tick that if that sort of quarantine is maintained for a few years the tick will disappear, and in many counties that has been done. Oklahoma has very successfully done that thing in quite a large district, as to which Doctor Melvin can inform you definitely; and they are attempting now to do it with respect to the whole State, and with proper aid from the Government they may be able to do it.

The State can do but very little of itself. It can maintain its commission, maintain the quarantine line and inspection, and it can keep up these districts. But the State is not able to undertake to buy the use of a pasture long enough to take all the animals right out of

it and let the ticks die. It would be somewhat difficult to do that, anyway, in most places; but there are localities where that could be done. But with a more extensive quarantine by both the State and the Federal Governments, and by taking localities from which they would be able to remove the live stock, undoubtedly the ticks can be from time to time exterminated; and this area will be driven south, south, until you gradually increase the country where the immune cattle may be produced and where the ticks will not be, and thus afford a market for them and a place where they can be bought.

All of these meetings which have been held by stockmen, and the Trans-Mississippi Congress—and I do not know what other meetings—have passed resolutions asking for liberal appropriations on this line. Undoubtedly there is no more important subject. Furthermore, there is no danger of squandering the money, because everything that is done is open to the observation of every man. There is no chance for “graft” in it. There is no possible chance for it. I think Kansas is as much interested in extending south of it the area where the ticks do not exist as Texas is, from a standpoint of political economy, and I believe that Oklahoma is. But we can only do it gradually; we can only do it by a settled policy, and if it is known that the Government of the United States is going to make liberal appropriations for that purpose, I have no reason to suppose that our legislatures will not do likewise. And I can say to you, gentlemen, that the Cattle Raisers’ Association of Texas will use every endeavor that it can to get the State to make the largest appropriation that it will to aid in the work; but the appropriation that will be made by the State, if not aided by liberal appropriations by the Government, will amount to very little, because both have to work together, and it can not be done except in that way.

Mr. LEVER. Mr. Cowan, if you will excuse me, I understand that you represent the Cattle Growers’ Association of Texas?

Mr. COWAN. Yes, sir; and I am attorney for the American National Live Stock Association, with headquarters at Denver.

Mr. LEVER. Have you any idea as to the amount of damage that the State of Texas suffers annually from the presence of the cattle tick?

Mr. COWAN. No; we simply know that it is large. It is just like many things of that sort, there would be no means whatever of being able to determine that. We do know that everything south of the line has to be marketed for immediate slaughter. You can not ship cattle from there north into the corn States for the purpose of being sold to feeders and fed there. We know that the cattle sold to feeders that come from the district north of the quarantine line bring \$2 or \$3 a head more on that market than those shipped for immediate slaughter. You take the 2-year-old or the 3-year-old steer and ship him from south of the line to Kansas City. He can not be sold to a Kansas feeder, and so he is sold to the packers. The packers have a dominion over the price of that animal, because the feeder can not buy him to take him out and feed him. But if you ship a steer there from north of the line there is a competition for him.

Mr. LEVER. As I understand it, then, the packing houses, or the men who buy cattle for packing purposes, have an absolute monopoly, as it were, upon the stock that comes from below the quarantine line?

Mr. COWAN. Absolutely; they can not be sold except for immediate slaughter, under the law.

Mr. LEVER. And you folks are at the absolute mercy of those people?

Mr. COWAN. Entirely.

The CHAIRMAN. Suppose those cattle are fat and ready to be immediately slaughtered, is there any discount upon their price?

Mr. COWAN. No; I think not. Mr. Chairman, because in that case we have the competition of the buyer who buys cattle to ship to butchering establishments over the United States generally; and, as you know, there is a very large amount of cattle sold to be shipped out all over the country for butchering purposes. In Chicago about 40 per cent of the entire sale of cattle there is sold for that purpose, and it is shipped all over the eastern part of the United States for butchering. If the cattle are fat the discount would not apply, because they get the benefit of the competition. But they are not fat enough to attract that trade, as a general rule, off of the grass. Of course many cattle are fattened at the cotton-seed-oil mills, and they can be shipped anywhere. I do not believe, however, that they are exported at all if they come from south of the line.

Mr. LEVER. Is it the practice of cattle growers to feed their cattle for a few weeks before sale?

Mr. COWAN. No, sir; if a man is a feeder in Texas, he is a feeder at oil mills, entirely disconnected from any ranch. Cattle are not fed on the ranch, except to keep them from dying in the winter, at any place that I know of.

Mr. BEALL. What are the individual stock raisers doing looking to the extermination of this tick? What expense are they going to?

Mr. COWAN. The individual stock raiser is perfectly helpless against the tick if he is located in the tick area, but he is active in enforcing the quarantine regulations. You take the county where Judge Smith comes from. Every stockman in that county tries to see to it that nothing is brought in from south of the line.

Mr. SMITH. A great many are putting in dipping vats to get rid of the ticks.

Mr. BEALL. That is what I want to get at.

Mr. COWAN. Yes; you will find investments of thousands of dollars in dipping vats on almost every ranch in the country, whether it is north or south of the line, and particularly those that are near the line; because occasionally you will get a little pasturage that will get some ticks in it, and the cattle can not be shipped unless they are dipped; and they have gone to a very large expense in that particular. I know I was out on a ranch not a great while ago belonging to Mr. Burnish; he has a very large ranch, and I looked at the vats he had built, and he had spent several thousand dollars in building vats in different pastures for the purpose of dipping his cattle. He is located right on the line. His county is quarantined against the south, and the north is quarantined against him. The only way he gets cattle out is by dipping them. They do exterminate the ticks from their pastures, in many instances, by frequent dippings. He had his place cut up into 26 pastures—226,000 acres, he told me; I think it is 26 pastures; and he undertakes, where he finds any ticks in the pastures, to dip all his cattle. For example, some evil-minded person had taken ticks and scattered them in his bull pasture, and it required two or three dippings of his cattle in that pasture to exterminate the ticks. So as to that expenditure, it is infinitely

more than both the State and the Government have ever spent. I think Doctor Melvin will vouch for that—that cattlemen have spent infinitely more than both the State and Government have spent in the attempt to rid their pastures of ticks where they are in an area that is susceptible of being made free; and that area is very large.

I think there is nothing else, gentlemen. I believe that all the people of the West, up to the Canadian line, will take it as a favor if this committee will make an appropriation of the sort suggested. The American National Livestock Association (for which I am attorney, and of which Mr. Mackenzie, who is here, is now vice-president, and was formerly president) passed a resolution on this subject at its meeting in Denver quite recently. The people who are delegates to that convention come mainly from the States north of Texas, and they are very anxious to have this done. I believe every stock convention in the West has asked for a liberal appropriation, and so have the State sanitary boards. The State sanitary boards attended the Denver meeting from Colorado, New Mexico, and Kansas that I know of, and some others, I think. Doctor Melvin was there, and he can tell you about it; and they drew the resolution that the stockmen adopted at Denver. That resolution, therefore, comes from the official State sanitary boards of States like Kansas, Colorado, and the Territory of New Mexico, and possibly some other States.

I think there is nothing more that I can say, gentlemen. I will not take your time further. Mr. Mackenzie is here, and he knows a great deal about the subject, being one of the largest ranchmen in the country.

**STATEMENT OF MURDO MACKENZIE, ESQ., VICE-PRESIDENT OF
THE AMERICAN NATIONAL LIVE-STOCK ASSOCIATION.**

Mr. MACKENZIE. My ranches are in Texas and South Dakota. I did not come here, Mr. Chairman, to make a talk on this subject. I did not know that I was to talk at all; but while I am not personally interested in this matter, except as president of the association, I feel that the people of Texas are very vitally interested in getting this tick killed out. We had a meeting a short time ago, and our association, which covers the whole western country of stockmen, passed a resolution in favor of this legislation to the extent of \$300,000, if I am correct in the amount.

The market for the cattle raised south of the line is being curtailed year by year, and it is a very important thing for the people, not only those south of the line but those north of the line, that the tick should be done away with, for two reasons: First, because the people south of the line would get an outlet for the cattle raised there if this tick was killed; and second, because the people north of the line could get those cattle to buy for the purpose of feeding them if they could be taken across the line for that purpose. In the meantime that can not be done. It is just as deadly, as you all know, for cattle south of the line to get among cattle north of the line with this tick on them as if you gave them a dose of strychnine. It will surely kill them; and any man who has had experience with the matter will be convinced of that without my telling him.

The Agricultural Department is doing a great work. Doctor Melvin is untiring in his efforts to carry out what is best for the stock

interests, and I would bespeak from the committee consideration for this matter, because I am sure, gentlemen, that whatever you do will be greatly appreciated, not only by the people north of the line but also by the people south of the line. The danger is that unless the tick is killed out it may crawl north on us, and we do not want that. We want to destroy it. If we once get it destroyed, I think we can keep it down. But I think Doctor Melvin will bear me out in stating that the indications are that the tick is going farther north. Of course it can go so far north that it will be harmless; but what we want is to get it done away with, and if the committee could see its way clear to recommend a good, strong appropriation for this purpose, the stockmen of the whole West would be very grateful.

I thank you, gentlemen; I did not intend to say very much.

**STATEMENT OF HON. JOHN C. FLOYD, REPRESENTATIVE FROM
ARKANSAS.**

Mr. FLOYD. Mr. Chairman and gentlemen of the committee: I do not desire to discuss this question at length. The State veterinarian from my State is here, and he will address the committee; but I want to commend the work that has been done by the Agricultural Department in my State in the last two years. It was first commenced, I believe, year before last, with two inspectors; last year it covered several counties in the State; and the work is highly beneficial and most satisfactory to the people of my State. They have reported five counties entirely free, and one other county is allowed to make shipments of cattle free on inspection. That is the work of one year; and there are a number of other counties that would have received equal benefit if the authorities had had funds available for the purpose. Of course the conditions are very similar in those counties to those that they have already investigated and worked in.

Our State and our people, I will say for them, are willing to cooperate heartily with the Federal Government in this matter. Our State legislature passed an act at its last session the purpose of which was to enable the State to cooperate with the Federal authorities in this quarantine matter, and empowering the police officers of the State to enforce regulations where the line has been established by the Federal authorities; and I rise simply for the purpose of commending the work and urging upon the committee the importance of not only passing the usual appropriation but an increased appropriation. I should be glad to see the bill introduced by my friend, Mr. Ransdell, passed; or, if that is not practicable, at least the \$300,000 appropriation. I think it could be used to great advantage throughout the southern part of this Union; and I heartily concur in the views expressed by other speakers here that this is a question which is not peculiarly local, because it affects all of the people of the United States. It affects the supplier of the market north of the line, and it cuts off a market from people who have cattle south of the line. It prevents people in the North from shipping their fine cattle to the South to sell to persons who desire to purchase them, as my friend Mr. Legare has explained to you very fully and very pointedly.

I thank you for your attention, and will be glad now to have you listen to my friend from my own State, Doctor Linton, the State vet-

erinarian of my State, who is engaged in that work; and I want to say that he has come to Washington for the purpose of appearing before this committee and presenting the work from that section of the South.

**STATEMENT OF WILFRED LINTON, ESQ., STATE VETERINARIAN
OF ARKANSAS.**

Mr. LINTON. Mr. Chairman and gentlemen of the committee, I will not take up much of your time, but will simply say a few words to you about what we have done in Arkansas, and what we intend to do.

Of course the quarantine line runs immediately between us and Missouri, so that we are altogether below the quarantine line; and in northern Arkansas, where all the work has been done, we lie immediately between the two safe belts. We are not far enough north to be free of the tick and to be safe, and we are not far enough south to be continuously infected and therefore have our cattle immune from the time they are calves. They do not become immunized when they are calves; so that we lose probably more in proportion in the northern part of Arkansas, where the ticks are fewer, than they do farther south, where the country is heavily infested with ticks.

We lose in two ways: We lose directly by the losses from death and failure to mature properly, and so on; but our heaviest loss, of course, is the loss of market. We can not send our cattle north when they are at their best and to such a market that they will fetch their best prices. We can only send our cattle, except during a certain part of the year, to the quarantine market. There, as has already been said this afternoon, they are bought up by the packers and the canners. They are not in any condition to be marketed as prime beef. We do not feed our cattle. We are not in the corn belt; and although we can raise cattle, we can not possibly bring them to such a finish, without too much expense, as to make prime beef of them; and when they go to the quarantine pens they are at the mercy of the packers and the canners, who buy them at a low rate, of course. That is the way in which we lose. Of course they can be sent to the native market later on, after the 1st of November. They can go during the open season by inspection. But without feeding we can not keep our cattle up in condition until the 1st of November. Two-year-olds, three-year-olds, and four-year-old steers that are ready to go to market in the latter end of August would probably shrink 100 pounds between then and the 1st of November, if we had to wait until then to send them to the native market.

In 1906 we started this work, although we had very little money to do it with, and practically no laws to carry on the work effectively. At the last legislature, however, we got a good law through enabling us to successfully quarantine and eradicate the ticks, and got a small appropriation of \$1,500. That was to last two years. With that \$1,500, and of course aided very much by the fund which was expended by the Bureau of Animal Industry in cooperation with us, we managed to clear six counties. That has been practically accomplished. Five counties have been practically cleared, and one county still has a little infection left in it. Those five counties have been recommended to go above the quarantine line, and the sixth county has been recommended to go above by inspection. That is, cattle will be

allowed to go up all the year round on inspection and certification of freedom from ticks.

The CHAIRMAN. Doctor, will it interrupt you if I ask you a question there?

Mr. LINTON. No, sir.

The CHAIRMAN. You know that the expectation is on the part of the Department that whenever the quarantine line is moved the Federal authorities will withdraw from the area north of that line, and depend upon the State authorities to keep that area free from infection?

Mr. LINTON. Yes, sir.

The CHAIRMAN. Do you think that the State authorities can be depended upon to do that?

Mr. LINTON. I was just coming to that point. The fact is that we have got these counties ready to go above, but they can not go above without some assurance from the State, some actual agreement drawn up to the effect that the State will protect this line in case it is dropped down. But the State has no money that can be used for the purpose of protecting this line; and if we are to get the benefit of having these counties above the quarantine line we will have to get money from somewhere to protect this line adequately.

With that object in view I held cattlemen's meetings in the six counties, and got started cattle growers' associations, and put the matter up to them. They were the counties that would derive the great benefit of going above the quarantine line; and I told them it was up to them to see what could be done to protect the line. The associations were started, and they asked us to try and find out what the expense of protecting this line would be; and we estimated the expense between the six counties to be about \$5,000 to protect it until such time as the legislature could take hold of it and appropriate money for that purpose. This \$5,000 was forthcoming almost immediately from the farmers and cattle owners of those counties by popular subscription.

I think that is the strongest argument I could possibly use to show that the people in Arkansas, or at any rate in that part of it where we had been working, are actively engaged in this tick-eradication work. I think that is the strongest argument to show that they are very much interested in the work.

The CHAIRMAN. The idea I had in asking that question was this: I realize fully, as every member of this committee must, the very great advantage that it would be to the whole country if the ticks could be eliminated. The only fear I had was that after a county or a number of counties in a given State had been once ridden of the tick, and the quarantine line moved below it, and the work was being prosecuted in other sections, by some carelessness on the part of the State authorities or perhaps without any fault of theirs, the infection might be returned to the counties and the work all have to be done over again. Is it your opinion that we do not need to fear that result?

Mr. LINTON. No, sir. There is the fear that there may be reinfection; but that is the one thing we have to guard against. It would be useless to clear up an area if we did not take precautions with that in view, to prevent reinfection. That is the one thing we have to guard against very particularly. And to do that the people of these counties have agreed to pay line riders to go along this line and prevent the

introduction of ticky cattle. If such a thing should happen that ticky cattle were, in spite of the line riders, to get in, they would be quarantined almost immediately; and to have a few cattle that were ticky quarantined immediately in a small area would not amount to much, because they could be cleaned up within a few weeks; that new area of infection could be cleaned up.

The CHAIRMAN. Another apprehension I have had along that same line has been that if an appropriation were made, very much larger than the one we have now, and the work as a result of that appropriation were either carried on faster or spread over a wider area, it might be done too rapidly, and it might be done so rapidly and so widely that the State authorities would not be able to organize to protect the released territory. What would be your judgment about that?

Mr. LINTON. I do not see any fear of that in our State, sir, for this reason: The people of each county have it put to them pretty straight that if they do not protect their own counties they will have this privilege of being above the quarantine line withdrawn. Probably that would be done; I do not know. Of course I suppose if a territory were reinfected, and no efforts were made to keep it from being reinfected, the Federal quarantine would be immediately moved, so that they would cease to receive the benefit from that.

Mr. RUCKER. Mr. Chairman, I will suggest right there, with your permission, that it must be borne in mind that every cattle owner will act as a sort of special policeman to watch this sort of thing. Every man who owns any cattle at all is individually interested in keeping that quarantine effective.

Mr. LINTON. That is a very good point, sir.

Mr. FLOYD. If you will permit me, I would like to make a suggestion in connection with your inquiry. The law that was passed by the legislature of Arkansas, as I understand its provisions, puts it in the power of the State authorities to enforce these quarantine regulations established in the State, and attaches a penalty to a violation of any of these orders. There are a number of orders specified, and it attaches a penalty to the violation of any of them, and empowers any sheriff or constable or any marshal of any city to arrest the parties, take them before a court of competent jurisdiction, and have them fined. The State law has reinforced the Department in that way by making any violation of these regulations that the Department establishes with reference to quarantine an offense against the State; and as it is in the interest of the cattlemen to see that they are enforced, it enables these regulations of the Department to be enforced by State action. That was the object and purpose of that bill, as I understand it. Is not that the way you understand the scope of it, Doctor?

Mr. LINTON. Yes, sir.

The CHAIRMAN. Still, from what the Doctor said, I judge that the expense of enforcing this law, for the present at least, must be borne by these people that he mentions.

Mr. FLOYD. Well, the appropriation made by the legislature was insufficient. It was only \$1,500. I do not know whether they asked for any more or not, but it was insufficient.

Mr. LINTON. Yes; more was asked for.

Mr. FLOYD. But I have no doubt that the legislature will make ample appropriation in the future for them; and this fund raised by

private subscription was raised by the people interested in cattle raising, to enforce it until the legislature can act, the legislature not being now in session.

The CHAIRMAN. I take it for granted that you gentlemen all realize the imperative importance of cooperation on the part of all the States through which this line runs, because it would not do any good if we spent \$1,000,000 a year and the territory that we cleaned out was immediately reinfected.

Mr. FLOYD. Mr. Chairman, as the representative of the State of Arkansas, I certainly realize the importance of the point suggested by the chairman; and the gentlemen in charge of that work in my State—I have never talked to Doctor Linton on that point, but Doctor Frye, who is also engaged in the work, told me that the worst difficulty is with the northwestern counties of the State, Benton County or Washington County, from the fact that the cattle come around through the Indian Territory, around Oklahoma, around the end of the State quarantines. Mind you, we have a State quarantine right below those counties, but they drive them around the end of that into our State; and there is where the principal infection comes from in the western part of the State—from Oklahoma.

The CHAIRMAN. That furnishes an excellent illustration of the truth of what I have just said—the necessity of cooperation along the whole line.

Mr. FLOYD. I am glad you called my attention to that, as I said.

The CHAIRMAN. Evidently Arkansas is doing her full duty in the matter.

Mr. LINTON. And, Mr. Chairman, in connection with that, I will state that there is a lawsuit pending now involving that matter. Since that law was passed we can prevent any reinfection in that way. That was the trouble. They were brought up from Indian Territory around above the quarantine line and down. We have no law to prevent cattle coming from above. They are brought in by train in that way. I think there is a lawsuit on now, pending at Gravette, Ark., which is the chief place of infection in that way.

Mr. WEEKS. Doctor, how much of an appropriation did you ask for?

Mr. LINTON. We asked for \$2,000, I think, and we got \$1,500. It was a very difficult matter to get that amount, and it was not appropriated for tick eradication; it was appropriated for investigation. By some mistake they evidently thought it was for investigation and not for eradication work.

Mr. WEEKS. What was the objection to making the appropriation?

Mr. LINTON. They simply did not believe it was possible to do the proposed work. Most of them did not believe in the tick, anyhow. That is a very common expression down there—they do not believe in the tick.

Mr. RANDELL. Do you think it will be very different when you go before the legislature next time, in view of the educational work that has been done?

Mr. LINTON. I think I will have a whole lot more backing than I had last time. All the people in the northern countries now realize it, and these counties that did not get the benefit of this work last year are seeing what these other six counties have done, and they are wanting it; so that the whole northern part of the State, at any

rate, will be trying to get that appropriation. I do not think there is any doubt about it.

Mr. WEEKS. You will ask for a good appropriation this time?

Mr. LINTON. Yes, sir.

The CHAIRMAN. Was that appropriation asked for to maintain the quarantine line or to cooperate with the Department?

Mr. LINTON. To cooperate with the Bureau.

The CHAIRMAN. How much of an appropriation was made for maintaining the quarantine line?

Mr. LINTON. Absolutely none. We have got to go to these people who are interested and raise the money, and we have been to them and appealed to the people of those six counties, and raised enough money, \$5,000, which we asked for. If we had wanted more—as we were told in the east, at any rate—they would come up with it. We estimated that it would cost \$5,000, and \$5,000 was forthcoming.

The CHAIRMAN. You do not expect to depend upon voluntary subscriptions for the permanent maintenance of your quarantine?

Mr. LINTON. No, sir; by no means. But, you see, this work was only started since 1907, practically speaking. We started before, but without either legislation or money. Now that we have that, we want to see that we get whatever additional legislation is needed and an adequate supply of money to protect these people.

Mr. RANSDELL. Mr. Chairman, permit me to make a remark there. I think it is hard for you gentlemen to appreciate the dense ignorance on the part of most of the southern people in regard to the cattle tick. When I introduced a bill here two years ago to give \$100,000 for the eradication of this cattle tick, a great many of the Members of Congress from the South laughed at me, and the newspaper men representing newspapers in the South made a great deal of fun of me. They simply did not understand it. The cattle tick was born with us, and it was there long before any of us were there. It is indigenous to the soil. We simply do not understand it or know anything about it. We do not care anything about it. It is only in the last two years that we have begun to realize the magnitude and importance of this question. And as Doctor Linton says, when he started to get that matter before the people of Arkansas, they thought there was a mare's-nest in it, I venture to say, many of them—and I think I understand the situation pretty well. They had no doubt there was a mare's-nest in it a big bug under the chip somewhere: and they would not give any money for it. Now they are getting enlightened on it, and I will wager that they will give all the money the scientists say is needed.

Down in my State we have been giving money (I do not remember the amount, but it is many, many times fifteen hundred dollars) for this kind of investigation. And as sure as you are born, sir, when Doctor Melvin's forces get scattered through the South and begin to educate these people by demonstration work such as he has been doing, the South is going to come up with a great deal more than this \$300,000 which you are going to give us this time, I hope, on behalf of the National Government. If we do not, I hope you will not give us any more. If we can not at least go you an equal amount, I hope we will not get any more from you, as far as I am concerned.

Mr. WEEKS. I was going to ask Mr. Ransdell if he does not think there ought to be some relation between the amount of money appropriated by a State and the Government in such work?

Mr. RANSDALL. I do, sir. I think there must be cooperation between the State and the Federal Government in this work, as in many others, to make a permanent success of it. For as Mr. Scott well observes, the Government will go there and teach our people and help eradicate the tick, and after the eradication is complete the Government can not remain there with its men and do the mechanical work of keeping the country free. The work of the Government, as I take it, is educational. It comes there and shows us how; and then if we have not the spirit and the enterprise to keep the country free we ought not to have had the help to start with. But we will keep it free, as sure as you are born. When you once show us how, once let us know how we can get rid of these ticks, and once give us the great benefits that will come from getting rid of them, we will keep our pastures free from them.

**STATEMENT OF HON. CHARLES B. THOMAS, REPRESENTATIVE
FROM NORTH CAROLINA.**

Mr. THOMAS. Mr. Chairman and gentlemen of the committee. I am here for the purpose of showing my hearty cooperation in this movement to secure an appropriation, and an increased appropriation, if possible, for the eradication of the cattle tick. I know that every committee in Congress wants, more than anything else, in hearings for appropriations, to have facts presented to them. I know that is true so far as my own committees are concerned. I am not prepared to-day to submit any specific facts, for the reason that I was not informed about this hearing until to-day. I can give the committee, however, in a general way only, some facts so far as the State of North Carolina is concerned.

At the last Congress, or the Congress before the last (I have forgotten which), I presented to the House and had printed in the Record a letter containing a very valuable statement from the commissioner of agriculture of North Carolina, Mr. S. L. Patterson, a very intelligent gentleman, familiar with this country and with the conditions here and abroad. In that letter he gave the figures showing the number of cattle in the State of North Carolina, the estimated value of those cattle, and the increased value which would accrue if the cattle tick could be exterminated in that State. Those figures were absolutely accurate, I feel sure, and they impressed me very greatly. The increased value, as I recollect the figures, and the Record will show the fact, ran up into millions.

I know, further, that, as has been said by my friend Ransdell and by the other gentlemen, this cattle tick is not confined to North Carolina or to any one State in the South. It extends over the whole southern country. The problem is to control the spread of the cattle tick, as I understand it. Therefore I hope the committee will give an increased appropriation for this purpose, and that this work will be continued.

Now, Mr. Chairman, let me say one word further in regard to the States. I think it a good thing to bring out these points, while I

shall not go into the subject fully. All this work of the Department of Agriculture, outlined on this map which I see here, is as I understand it largely cooperative with the States. The whole work of the Department of Agriculture, Mr. Chairman and gentlemen of the Committee on Agriculture, is not only of the utmost importance to the people of the country—and I regard all the work of the Department of Agriculture as one of the most important works in which the Government is engaged—but the work is, in most instances, wherever the States are involved, a cooperative work. I think, with Mr. Ransdell, that the States ought to do their part in all these appropriations, and if the committee in its wisdom increases this appropriation, and if this cattle tick, with increased appropriations from year to year, is finally exterminated, the States ought to see that the conditions which the National Government has made possible by its appropriations are maintained.

Now, I believe the States will do that, because it is a matter of great importance to them, not only as regards the extermination of the cattle tick, but in all other matters. While the States may not at this time do all they can in all these great works of the Government, yet these works are cooperative, and many of the works of the Department of Agriculture are national in scope and character. The States can not do the work so well—they have not the experts—as the National Government. They do their part. I am a pretty good State rights man, but I do not think that question enters at all into these appropriations for the works of the Department of Agriculture. I think that what we get, Mr. Chairman and gentlemen of the committee, for all these works of the Department of Agriculture, is after all a mere bagatelle in comparison with appropriations for other governmental objects; and while States should do their part I believe the National Government can not do, and is not doing, any more important work than it is doing through the Department of Agriculture for all the people of this country in every section of it.

Mr. WEEKS. How much money has North Carolina appropriated for this work

Mr. THOMAS. Mr. Weeks, I can not answer that question. I ought to be posted, but I am not able to say now. I did have the figures at the last session of Congress, but I do not recollect them now.

Mr. POLLARD. I have the figures here.

Mr. THOMAS. What are the figures?

Mr. POLLARD. The United States Government gave North Carolina, last year, \$19,600, and the State gave \$2,700.

Mr. THOMAS. I confess that the proportion in North Carolina—and no doubt that is true as to other States—is small in comparison with the appropriation from the National Government; but still this is a work which is national in its scope and character. The cattle tick goes beyond State lines, and its eradication is for the benefit and advantage not only of North Carolina, Louisiana, and other States, but for the benefit of Kansas and Missouri and the States of the West and North as well as the States of the South.

I hope, gentlemen, that you will deem it best to increase this appropriation. I think it is an exceedingly valuable work of the Government through the Department of Agriculture.

**STATEMENT OF HON. JOHN T. WATKINS, REPRESENTATIVE
FROM LOUISIANA.**

Mr. WATKINS. Mr. Chairman, the proposition has been laid down here this afternoon that the South loses about \$100,000,000 on account of the ravages of the cattle tick, that is, the Texas fever, which is caused by inoculation from the cattle tick. But no statement has been made as to what the North loses by it. The \$100,000,000 is made up by the depletion in the frame and size of the animal in its infancy and all through its entire life. It is stunted when it is a calf. It grows up in that stunted, emaciated condition in those sections of the country where the tick prevails. It is made up, partially, on account of the abortion, produced by this inoculation; also by the expense of the quarantine, the detention in the quarantine station during transportation, preceding and at the end of transportation. It is made up in loss of price, which is one-half cent for each pound of beef.

Those are estimates that have been made, and there are others which might be enumerated as to the losses to the South; but when it comes to the losses of the northern section of the country, that portion north of the quarantine line, I have not heard any statement made at all.

I know from personal experience and from inquiries—from information which I have from reliable sources—that at least one-fifth of the cattle shipped in from north of the quarantine line, calves of 1 year and under 1 year of age, die; and that above that age, whether they are inoculated to make them immune or not, about 20 per cent over 1 year of age die. There are a great many cattle shipped north of the quarantine line, into the South, and there would be a great many more shipped there if it were not for the fact that so large a percentage of them die on account of their becoming inoculated with this cattle-tick virus and taking the Texas fever.

Mr. WEEKS. Do you think that is entirely due to the tick, or partly to becoming acclimated?

Mr. WATKINS. It is acclimation. Acclimation consists in the fact that they have not heretofore been inoculated with the virus from the ticks. This inoculation is what causes the acclimation fever, as we knew it only a few years ago; and that is what causes the death of the cattle. That is the way I understand it. If that is not correct I am certainly misinformed.

Mr. LEGARE. That is correct.

Mr. WATKINS. That, I think, is a correct proposition. Do I understand that that is not the case?

Mr. LEGARE. I say that is correct.

Mr. WATKINS. In addition to that 20 per cent of all over 1 year old and one-fifth of all under 1 year old die. There are a great many cattle shipped from the South into the North, and people invest in that class of cattle for the purpose of inbreeding or crossing. The cattle which are carried there with the cattle tick contaminate the other cattle and infect them in the North (an estimate should be made on that bases), and not only are many of them lost on that account, but large amounts of capital are invested in cattle in the South which are shipped to the North for the purpose of converting them into beef, and large numbers of them die. For this reason the esti-

mate should be about double, aggregating, in all probability, in the neighborhood of 30 or 40 per cent of the value of the cattle shipped from the North into the South. About 30 or 40 per cent of the value is lost by people north of the quarantine line on account of the cattle tick in the ways suggested.

Now, as to the appropriation of \$500,000. From the inquiries which I have made I am not prepared to say that the \$500,000 could be profitably invested at this time in the destruction of the cattle tick. I do think, though, that \$250,000 would be a very reasonable amount. In taking the authority to make this statement I wish the committee to understand that I am not speaking alone from information that I have derived at first hand, from my own knowledge, but also from inquiry spreading over about three or four years of investigation, and from individuals who have had experience through the medium of heavy losses on account of the ravages or damages done by the cattle tick. But, to deal in individualities, as one of the members has done, about fifteen years ago I invested in Jersey cattle. Thinking that Jersey cattle died on account of the fact that they were of a delicate nature, and not knowing the real cause of it, I lost all the Jersey cattle I had, without knowing how to remedy the trouble, without having them inoculated. Other people in my own vicinity did the same thing. They invested large amounts in Jersey cattle from Tennessee, Kentucky, and other places, and invariably three-fourths, and sometimes four-fifths, died. All of mine died.

After that I made an effort to establish a small ranch. I might call it. It was more in the nature of a farm, however, than a ranch. I bought about 1,000 acres of land, and intended to raise Hereford cattle on it. I got those cattle from Texas. They all died with the exception of one, and that one was under a year old at the time he was purchased, and became immune.

The next experiment I made was with Durham cattle. Three years ago was the first time my attention was directly called to this cattle-tick proposition. At that time I purchased 16 females and 1 male and carried them out on my farm. They had ticks upon them. I thought, of course, having had some intimation that the ticks had something to do with it, that they would be immune. It happened, however, that they had come from an immune section, and had got the ticks on them after they came into my section; and out of that 17 head 12 died—all on account of the cattle tick. Those that remained were sold for one-half of what I gave for them, after I had carried them through two winters. They were under a year old when I got them, and after the expense of keeping them two or more years they were all sold for one-half of the original cost of the cattle.

In my State, Louisiana, there are only two parishes in the State in which the experiment has been made of utilizing the appropriation which has been made by Congress through this committee for the purpose of exterminating the cattle tick. Those two parishes, corresponding to the common-law counties of the other States, are in Mr. Ransdell's Congressional district. In these parishes only we have what we call the "no-fence" law, and it is easy to make the experiment in these particular parishes. The experiment has been tried in Claiborne Parish. In Webster Parish during the past sum-

mer it was almost impossible for the butchers in that section of the country to obtain beeves in condition to be slaughtered, unless they got them from the adjoining parish of Claiborne, in which territory they were invariably in good order during the months of August and September. At the time my cattle died in my parish the experiment had not been tried, and the Government had made no experiments there. The cattle were emaciated and not fit for use at all. For instance, in the South, we do not feed even beef cattle in the middle of the summer. In the winter we fed them and have to give them a great deal more on account of this tick infection.

Mr. August Mayer, of Shreveport, a large cattle dealer, who buys cattle from all over the United States, particularly Missouri, Kentucky, and Tennessee, and who raises mostly Durham cattle, estimates that he loses \$5,000 every year, on an average, on account of the cattle tick. I have neighbors around me whose experience is the same as my own.

I am sorry I did not have some notice, so that I could have prepared data for this meeting this afternoon. I was only notified about five or ten minutes before I arose, that I was expected to say anything. If our veterinary surgeon of the State of Louisiana, our commissioner of agriculture of the State of Louisiana, and the superintendents of the agricultural experiment station, had known that the meeting was to be had on this occasion, they would have been glad to have been here to present their views, if it had been desirable for them to do so.

I hope, in making this statement about \$250,000, that the committee will not understand that there will be any objection to their recommending the appropriation of a much larger amount. I would not feel authorized to state for the people whom I represent that a larger amount could be utilized beneficially or profitably, because I have discussed it thoroughly with them.

In this hasty and desultory way I am not prepared to go over all the facts and figures; but I have discussed the matter with my people and know that their idea is that at least four or five times what has been used heretofore ought to be used in the future for the purpose of exterminating the cattle tick.

Mr. RANDELL. You say \$250,000. Will you not admit that you would like to have the same work done that I desire to have done? Last year they could work only in two parishes, and we have fifty-eight. Would you not like to see the work done in the fifty-eight parishes?

Mr. WATKINS. No, sir; it is not necessary. In the southern part of the State a great many of the parishes could not do it, and it is not necessary to go to that expense. In my parish they are very anxious to have the work done; but there are places in the State where they have already started the work. I believe in starting at the center and spreading out. I believe it is the thing to start at a central point and spread out in all directions. I am satisfied, though, that \$250,000 could be very profitably used.

ADDITIONAL STATEMENT OF MR. GEORGE S. LEGARE.

Mr. LEGARE. Can I say one word, Mr. Chairman?

The CHAIRMAN. Certainly.

Mr. LEGARE. I neglected to call especial attention to the fact that the reason for a larger appropriation is that those of us living, for instance, in the southern part of our State do not want to bring the belt line right down to us and stop. The only way they can beat it is to gradually bring the belt line a little lower and a little lower. In other words, if you do not give enough to push this work rapidly you are going to bring it right down and stop, and put us almost out of business. If we can not ship out we will be at a disadvantage. For that reason I believe that the appropriation ought to be larger.

STATEMENT OF HON. WYATT AIKEN, REPRESENTATIVE FROM SOUTH CAROLINA.

Mr. AIKEN. Mr. Chairman, what I do not know about this matter would fill a large volume, and what our people down in South Carolina do not know about it would fill several large volumes; but during the past twelve months or year and a half they have become very much alive to the importance of the eradication of this tick evil.

I do not propose to detain the committee one minute, except to urge upon you to recommend as liberal an appropriation as you possibly can. I agree with Mr. Ransdell. I do not believe that \$500,000 would be too much. Last year our State, I understand, spent about \$1,500; and, from statements made in the newspapers, I believe our legislature now in session will very probably appropriate \$10,000 for that purpose.

The people in my district are progressive. They raise lots of fine cattle, and they are deeply interested in this matter; but the ranches in my district are above that cattle-tick zone.

I only wish to say I very much hope you will give the matter your careful and favorable consideration. That is all I care to say.

The CHAIRMAN. Is there anything further to offer, Mr. Ransdell?

Mr. RANSELL. There are no other Members of Congress here, I believe, to be heard. I would like, and I think all the gentlemen present would like, to hear something from Doctor Melvin. Perhaps you have already heard him.

The CHAIRMAN. The committee is always glad to hear Doctor Melvin, but I will say that we have interviewed him on this subject. He was before the committee some three weeks ago, and what he had to say at that time is printed and is available for the use of the committee and any others who are particularly interested in it. So that unless there is some special subject on which you would like particularly to hear Doctor Melvin at this time, I do not think the time would be profitably occupied.

Mr. LEVER. There are one or two questions I would like to ask Doctor Melvin.

The CHAIRMAN. Very well.

STATEMENT OF DR. ALONZO D. MELVIN, CHIEF OF THE BUREAU OF ANIMAL INDUSTRY.

Mr. LEVER. Doctor, in your estimates you ask for only \$150,000. It is possible that that might give the impression to the committee and to Congress that you really did not need or want any more for this purpose than that amount? Will you please state to the committee your exact position with reference to that?

Doctor MELVIN. That was the estimate of Secretary Wilson, and not my own. I have felt for some time that the estimate of \$150,000 is not as large as it should be to carry on the work effectively.

To go back several years, the Bureau has been engaged in tick eradication to some extent for ten or twelve years, or more. About 1897 the tick line in California was as far north as Sacramento, and in North Carolina it was extended practically to the Blue Ridge Mountains on the west. That line in those States, and in some other States, was reduced very much. Two or three counties in northern Georgia were removed from quarantine before there was any special legislation on this subject. That work was all handled under the general law under which the Bureau was operating. The line in California was reduced—that is, brought south on a line with Sacramento to the northern part of Merced County. Now, this tick area is confined almost exclusively to the coast country lying between the mountains and the Pacific, and in the extreme southern part.

To explain the discrepancies, or apparent discrepancies, in the amounts expended by the States and the Department, I would like to state that that has very largely come about on account of this previous work. You will see that in the States where we have been working for some years larger amounts are spent in proportion by the Government than in other States where we have not done work. That is due to the fact that we can not progress in the work unless we have the full cooperation of the stock owners. If they do not work with us, no matter how good the Federal laws may be, or the State laws may be, we can not make any substantial progress. We have some opposition in all States, but we must have the support of the majority of the stock people.

In these States, where we had been operating for some years, the people more fully understand the benefits to be derived by tick eradication than they do in other States. Take, for instance, the State of South Carolina. We only commenced there in a very small way two years ago, in the line of demonstration or education, to determine whether it could be done. The same thing was done this summer in Louisiana in two counties. One reason why it was not taken up in any other section was because our appropriation was small, and it has been the policy to demonstrate first to these people and show them that this work is feasible before we undertake to set out and eradicate the ticks from a large section of the country. I think that the interest that has been taken in the work as we have gone along justifies an increased appropriation, because wherever we have done the work the people have taken so much interest in it that they now want it. In sections of the country where no attention had been paid to it until the last year or two they are only awakening to the fact that this can be done and that it is to their very material advantage.

Mr. LEVER. If you will permit me right there, you have given in a previous hearing a statement of the amount of money expended by each of the States in cooperation with the Government in this work. Is this statement the same statement you gave me a few days ago in answer to a letter, showing the appropriation by the States for this purpose?

Doctor MELVIN. I think it is, or practically the same. That is supposed to cover the expenditures during the first ten months of the last calendar year. I do not recollect just what the statement I gave you by letter was.

Mr. LEVER. As I remember it, the State of California, in the statement you gave me—I do not happen to have it in my pocket now—was expending about \$15,000 per annum in cooperation with you, an equal amount to that being spent by the Federal Government.

Doctor MELVIN. Practically the same.

Mr. LEVER. But I see by those figures that California is expending only \$5,650.

Mr. POLLARD. The counties expend \$9,387. The total is \$15,000.

Doctor MELVIN. Yes; a great deal of this money is provided by the counties; and in some cases, as in this case, the counties themselves provide more money than the State does. These figures do not always represent all that is spent. For instance, in the State of Texas, where the State practically did not expend a dollar, or where the expenditure was very small, the stock owners have built between two and three hundred dipping vats and have spent large sums of money trying to rid their ranches of infection. That does not appear in that statement and it can not be very well brought out in such a statement; but I think I am safe in saying that the cattle owners of Texas have spent more money during the last year than the Federal Government has.

Mr. COWAN. With reference to those dipping vats, how much does each of those vats cost?

Doctor MELVIN. Well, the cost varies considerably, according to the extent of them. I suppose they cost in the neighborhood of \$1,500 to \$2,000 apiece.

Mr. COWAN. I just wanted to ask the question so as to show the amount of money that was spent.

Mr. POLLARD. I see by this statement here that last year in the State of Tennessee you expended \$42,278, more than twice as much as in any other State except Oklahoma. Why was it that so much more was expended in that State than in other States?

Doctor MELVIN. The conditions there seemed to be very favorable for pushing this work. We considered it good policy to spend most of this money where the people were ready to take it up and rid the farms of the ticks.

Mr. POLLARD. You find, then, as the work progresses and the people come to realize its importance, that they respond more promptly and readily?

Doctor MELVIN. Yes, sir; decidedly so.

Mr. POLLARD. With their efforts, time, and money?

Doctor MELVIN. Yes, sir. Of course, there are exceptions to that rule. In some sections of the country land is lying vacant. I do not know who it belongs to. I suppose hardly anyone knows who it

belongs to; but it is the general practice for small lots of cattle (one or two head, owned by an individual) to run on these commons or swamps and the like. Where they have to confine their cattle in such regions, as they must to rid them of ticks, our work is not popular: but where it is carried on differently, on ranches that are fenced and where the cattle can be controlled, it is popular, and the people want it.

Mr. RANSDELL. As a general thing, you find the people very responsive to the work, do you not, and anxious to have it go on, and willing to cooperate?

Doctor MELVIN. Yes, sir; generally very anxious, and they are urging us in the States to force others who are laggards to comply with the regulations.

Mr. POLLARD. May I make this inquiry: From your knowledge of the situation, how much do you think you would receive from the various States, counties, and individuals down through the States where you are operating, supposing that the Government would appropriate the same amount of money that was appropriated last year? I see by this statement that in round numbers last year the Government appropriated \$175,600, and you received from various States and counties in round numbers \$50,000. How much do you think that would be augmented another year?

Doctor MELVIN. It would be very hard for me to make even a very close estimate. I understand that South Carolina is now making an effort to have money appropriated for this purpose. In some States they do not have funds for this specific purpose, but it is appropriated in a general way, which would cover this work. Take the State of Texas; there the legislature does not meet until next year, so that they will not be in a position to provide funds until then.

Mr. POLLARD. I see by this statement that that State only appropriated \$25.

Doctor MELVIN. That is merely a nominal sum, but, as I explained, the stockmen themselves did provide a very considerable amount.

Mr. BEALL. Did not Texas cooperate with you in establishing and maintaining a sort of a common quarantine line running through Texas?

Doctor MELVIN. Yes, sir; the State law of Texas required that.

Mr. BEALL. Is it a fact that the State of Texas has for many years maintained a quarantine commission, whose duty it has been to look after the protection of this quarantine line?

Doctor MELVIN. Yes, sir; and other matters, too.

Mr. BEALL. It is expending about \$20,000 a year for that commission, is it not?

Doctor MELVIN. I do not know.

Mr. BEALL. There is no specific appropriation, perhaps, for the eradication of the cattle tick, but the maintenance of that quarantine commission is for the very purpose of preventing the spread of this disease beyond the quarantine line, is it not?

Doctor MELVIN. Yes, sir; that and the control of all contagious animal diseases.

Mr. BEALL. But this so-called Texas fever is the chief one?

Doctor MELVIN. That would be included in it.

Mr. LEVER. Just in that connection, if Mr. Beall will excuse me, you speak of the control of these contagious diseases. You do not

make the basis of your operation in a State dependent upon the appropriation made by that State for cooperative work with you, do you?

Doctor MELVIN. No, sir; we have not made it entirely dependent upon the appropriations. Of course we must have the State law to work with.

Mr. LEVER. I understand that and the individual cooperation.

Doctor MELVIN. Yes.

Mr. LEVER. For instance, in the work in connection with the sheep scab in the West, you do not look to the legislatures of the various Western States to appropriate as a condition precedent to your going into that State, do you?

Doctor MELVIN. No; not specific amounts.

Mr. LEVER. Do you happen to know how much the various Western States appropriate for cooperative work with you in the work in connection with the sheep scab?

The CHAIRMAN. Mr. Lever, that question was asked of the Doctor in his hearing, and he gave the figures.

Mr. LEVER. But the figures are not here. I can not find them.

The CHAIRMAN. Yes; they are there. I just made a note of it. The statement which he made at that time shows that the States of Arizona, New Mexico, Texas, Nevada, Utah, and Oregon provided \$129,668 toward the cooperative work with the scab and the mange.

Mr. COOK. Do you consider the estimate of \$150,000 inadequate to carry out successfully the work of your Bureau for the coming fiscal year for the eradication of the tick?

Doctor MELVIN. Under the present conditions; yes, sir. I think we should have a considerably larger amount.

The CHAIRMAN. We appropriated \$150,000 last year. Your statement shows that you spent \$175,000 in this work. I presume you drew the \$25,000 from your general-expense account?

Doctor MELVIN. Yes, our general-expense fund.

Mr. LEGARE. They put in over 300 new vats or dips in Texas last year, did they not?

Doctor MELVIN. They put in between two and three hundred. I do not know how many.

Mr. LEGARE. At a cost of \$1,000 apiece that would be between two and three hundred thousand dollars spent in that way alone, by individuals, in that one State.

Doctor MELVIN. Yes, sir.

Mr. MACKENZIE. I would like to say that when this quarantine line was established the State of Texas maintained the quarantine line at its own expense. There was one inspector from the Bureau of Animal Industry. The State of Texas, I will say as a cattleman from that State, will always contribute for the purpose of eradicating this tick. I do not think you need have any fear of that, as far as we are concerned. The cattlemen are always willing to do that. No matter whether the State will do it or not, the individual cattlemen will contribute their share for eradicating the tick. I think Doctor Melvin will bear me out in that.

Doctor MELVIN. Yes.

Mr. WEEKS. I would like to ask one more question, Doctor, which is suggested to me by the question put by the chairman. You spent \$175,000. I do not understand where that extra \$25,000 came from.

Doctor MELVIN. We have, under our general law, authority to expend money in the eradication of contagious diseases, and we were fortunate in having those funds in our general expenses.

The CHAIRMAN. You do not consider, then, that when a specific appropriation is made for the eradication of a specific disease that you are limited in your expenditure on that work to that specific amount?

Doctor MELVIN. Well, I did not in this instance; no, sir; because we had been performing this work before, under our general authority, and it was a question of either expending this additional amount or else permitting a great deal of the territory that had been freed to become reinfected.

The CHAIRMAN. I thought you gave us the impression that when a territory had once been freed it was the business of the State authorities to keep it from being reinfected?

Doctor MELVIN. That would apply to a considerable extent of country, like a county or half a county or several counties, but what I had reference to were individual farms, where we had worked, and where the individual farm had been freed—but not all the farms. Even in some of this country above the quarantine line there may be one or two farms where infection still exists, but the States maintain those farms under close quarantine. We would not consider it fair to keep all the rest of that territory below the quarantine line for those few, as long as they are maintained in quarantine.

The CHAIRMAN. Why were those farms left in a freed district?

Doctor MELVIN. Because the States did not have authority to seize cattle and dip them; but they could maintain them on the farms for an indefinite period.

The CHAIRMAN. Is it not rather important that the States should assume that authority and exercise it?

Doctor MELVIN. Well, they do to the extent of quarantining.

Mr. WEEKS. Does that mean that the Government is put to this additional expense because the States have not made proper provision for carrying out this quarantine? Practically, it looks to me as if the States were holding up this work.

Doctor MELVIN. I do not quite understand. I do not quite catch your meaning.

Mr. WEEKS. My meaning is that if you could have properly quarantined these cattle it would not have been necessary to have made this additional expenditure, would it?

Doctor MELVIN. Of this \$25,000 you speak of?

Mr. WEEKS. Yes.

Doctor MELVIN. Well, I do not know that that necessarily follows. In a work of this sort you must go ahead. You can not arbitrarily stop unless you relinquish a great deal of the good that has been accomplished.

The CHAIRMAN. I understand, from what you have said before the committee on previous occasions, that occasionally you do find a man who refuses to follow the directions of the bureau?

Doctor MELVIN. Yes, sir.

The CHAIRMAN. And the only thing you can do with him, then, is to quarantine his particular farm?

Doctor MELVIN. Yes, sir; the State does that.

The CHAIRMAN. That is, to have the State do it?

Doctor MELVIN. Yes, sir.

The CHAIRMAN. Can not the State pass laws, and have not some of the States passed laws, absolutely requiring all its citizens to submit to your directions?

Doctor MELVIN. Well, some States have and others have not. In some instances the State authorities have the right to go upon the premises and require proper disinfection, and the live stock remains as a lien for the expenses incurred by the State. That is not the usual rule, though, except in diseases such as the glanders and some diseases of that nature. Usually they stop at a quarantine.

The CHAIRMAN. Your work is much more effective in States which have the law to which you have just referred, is it not?

Doctor MELVIN. Well, that is not the general rule. Usually a quarantine is sufficient, because it is obvious that one must move his stock to market, and if he is placed in quarantine he will try to place his stock in a condition so that it can go to market.

Mr. POLLARD. I would like to ask Doctor Melvin a question, suggested to me by the questions put by Mr. Weeks. I understand from your statement, Doctor, that this \$25,000 that you drew out of the general expense fund was used largely in keeping free from infection, or reinfection, districts that you had already gone over. I would like to inquire to what extent the Government is being compelled to keep free from reinfection districts that you have already released from quarantine, and have cleared from the tick?

Doctor MELVIN. Probably the best answer I can make is to state what it cost the Government before we commenced eradication in maintaining the quarantine line. A large amount of money was expended for maintaining this quarantine line before tick eradication commenced, varying from about \$45,000 to \$50,000 a year; and I do not see how it can continue at very much less than that unless we should eventually eradicate it from the entire section. For instance, if we can eradicate it from California there will be no need in the future of keeping anyone in California. It has been our custom to have from one to two men in California the year round to maintain the quarantine line. We have various men scattered all along the line, commencing in Texas and running clear to the Atlantic coast. We have also had to supervise the cleaning and disinfection of the cars that carry the stock out of the quarantine district, and have had to maintain them at these feeding yards where the stock is carried for food and water, and to market, and all that expense. That has, as I say, amounted to between \$45,000 and \$50,000 a year. I do not see how it can be made any less until we get a considerable area released from quarantine.

Mr. RANDELL. You would be relieved entirely of that if you had the ticks eradicated from the country, would you not?

Doctor MELVIN. Yes.

Mr. POLLARD. Are there any States that are taking on their own shoulders the work of preventing the reinfection of districts that you have cleared?

Doctor MELVIN. They have to in this way: For instance, we can only maintain a State line; but in consideration of a State guaranteeing to maintain a line through the State, or within the State, we modify our line to conform with theirs; and, of course, if there was a violation of that quarantine line within the State, if cattle passed

from one section of the State across the line into another portion of the same State, it would be under the State supervision. It would be the State's duty to prosecute and maintain that line; but if they went into another State, then we would have jurisdiction.

Mr. COWAN. I just want to satisfy the committee upon a point as to which I do not think they are well satisfied. That is, they are possibly not informed on it. Is it not a fact that the quarantine line extends about 450 or 500 miles through the State of Texas from near Grier County, Okla., up to the Rio Grande, in the neighborhood of Presidio County?

Doctor MELVIN. Yes.

Mr. COWAN. Is it not a fact that the State of Texas and the cattlemen along that line have been maintaining it for many years to prevent a movement of cattle from below to above the line?

Doctor MELVIN. Yes. They must do that within the State of Texas.

Mr. COWAN. Is it not a fact that also along that line, both south of it and north of it, there are special quarantines that the State maintains around certain counties in order to undertake to eradicate the tick and to get the line moved farther south?

Doctor MELVIN. Yes.

Mr. COWAN. Has not the expense of all that been on the State and the cattlemen along in the State, or pretty nearly all of it?

Doctor MELVIN. I can hardly say all of it has been, but the greatest part has been borne by the State.

Mr. COWAN. When we first established the quarantine board in Texas, is it not a fact that there was an agreement between the Agricultural Department and the State, whereby it was established according to the line established by the Bureau of Animal Industry?

Doctor MELVIN. Yes, sir; I think the present State law requires the State board to fix their line in conformity with that of the Department.

Mr. COWAN. Did not the State the first year appropriate \$20,000 for the maintenance of that line?

Doctor MELVIN. I do not know as to the sum. I am not familiar with that.

Mr. COWAN. Is it not a fact that when the State has not appropriated a sufficient amount that the cattlemen themselves have made up the money and hired inspectors and kept the line as well protected as the lines you have established along the State lines?

Doctor MELVIN. Yes, sir.

Mr. COWAN. Is not that about the only State except California that has maintained any extensive line within the State?

Doctor MELVIN. Well—

Mr. COWAN. Well, I do not care anything about that. I wanted to ask these questions, gentlemen of the committee, to show that the State had been doing everything it possibly could to maintain the line which has had reference to the cattle tick. That is not with reference to the glanders or any other diseases, but wholly with respect to the tick.

Doctor MELVIN. In the former Territory of Oklahoma there was an extensive line through there that that Territory maintained at their own expense, and that has been the general policy; but the Department has, as I stated, had some men along this line assisting in the work.

Mr. COWAN. I would like to ask one other question. You refer to the fact that Texas has not appropriated anything for the purpose of eradicating the tick. That is not quite fair, in view of the fact that that line has been maintained with a view solely for the purpose of preventing the spread of the tick, and to reduce the area wherever they could. It is hardly fair to say that the State did not appropriate anything for it.

Doctor MELVIN. I meant in line with this particular appropriation.

Mr. COWAN. I understand; but the committee might have misunderstood it. The State is spending a large amount of money on really that very subject, although not by name.

ADDITIONAL STATEMENT OF HON. CHARLES B. THOMAS, REPRESENTATIVE FROM NORTH CAROLINA.

Mr. THOMAS. Mr. Chairman, I would like to have printed in the hearings the letter of the commissioner of agriculture of North Carolina, Mr. Patterson, of whom I spoke when I was on my feet before.

The CHAIRMAN. Yes. That may be done.

Mr. THOMAS. It is contained in the hearings of the last Congress and it is a very valuable letter. Let me say one thing more—not to detain you. It is shown here what the commercial value of this proposition of national aid in cooperation with the States is. It is also shown what the State of North Carolina has been doing, that it has been gradually getting away from the national quarantine laws and has been gradually making additions to its exempted area. Then Mr. Patterson estimates the number of cattle subject to quarantine restrictions in Southern States, exclusive of Virginia, Tennessee, Oklahoma, and Indian Territory, to be more than 97,000,000; and estimating the increased value, if the cattle tick can be eradicated, at \$1 per head (I have no doubt the value is more than that), he estimates that the benefit to the National Government would be about \$100,000,000; and that in North Carolina the increased value, estimating it to be \$1 a head, would be about \$10,000,000.

The CHAIRMAN. If there is no objection, the letter you refer to will be inserted in the record.

The letter referred to is as follows:

NORTH CAROLINA DEPARTMENT OF AGRICULTURE.
Raleigh, N. C., January 23, 1906.

HON. CHARLES B. THOMAS,
House of Representatives, Washington, D. C.

DEAR MR. THOMAS: An effort will be made to secure the cooperation and aid of the Federal with the Southern State governments to exterminate the cattle tick.

Cattle raising must play a far more important part in the future in our Southern farm economy than it has done since the war. The tick is its greatest menace.

This department, taking the lead in this, as it has done in several other measures, has secured the exemption of all the transmontane counties and several of the piedmont counties from the restrictions of the Federal quarantine laws. Getting away from the cattle mountain ranges, some of which have been badly infested with ticks, and reaching the stock-law section of the State, we will make rapid strides eastward. We will soon reach Mecklenburg, Rowan, Davie, Yadkin, and Stokes, and every subsequent year will mark a substantial addition of territory to the exempted area. But it is an interstate question, and the Government ought to give its aid. As our exempted territory extends eastward

longer stretches of Virginia and South Carolina border lines are left exposed, unless these States shall keep faster step in their respective territories.

Let me give you just a few figures:

According to the last report of the United States Department of Agriculture there are in the Southern States, exclusive of Virginia, Tennessee, Oklahoma, and Indian Territory, 97,474,876 cattle—that many cattle subject to quarantine restrictions, except in those localities where the tick has been eradicated.

Suppose these cattle averaged 450 pounds in weight—low estimate, is it not?—and suppose the increase of value consequent upon the extinction of their deadliest enemy is placed at only one-fourth of a cent per pound—another too low estimate—the increase of value would at once amount to \$109,659,235. Or suppose we say, in a rough way, that a value of \$1 per head will follow, and we add to our cattle's worth \$97,474,876. But this is not all or the greatest benefit to come.

It has not been safe to import clear-blooded cattle into the tick region of the South. They died. With the tick removed, cattle could be transported here from any section of the world in safety. A new impetus would be given to industry, such as has not been known for many years, if ever before in the history of the South. More cattle of good breeds would be introduced, feeders would utilize their own rich cattle foods, such as pea-vine hay, corn stover, cotton-seed meal and hulls, and our big fertilizer bills might be reduced by the substitution of increased savings of homemade manures.

All this can be done. Secretary Wilson is in favor of the bill. I know you will give us your aid.

Yours, very truly,

S. L. PATTERSON, *Commissioner*.

I am trying to make my letter as short as possible, but I want to add that of the number of cattle quoted North Carolina is accredited with 9,175,782 head. They are of larger size than cattle farther south. It would be certainly safe to count their added value at \$10,000,000.

The CHAIRMAN. Before adjourning the committee, I would like to make two or three very brief observations. It was suggested here that if notice had been given delegations from the States interested would have been here to ask a hearing. The committee was advised that some such delegations would appear here if they were desired, but the committee thought best not to invite them, partly because we feel pretty well educated on the subject. There was a very exhaustive hearing upon it two years ago, as you all remember, and since then we have had Doctor Melvin before us annually to make a report upon the work he has been doing, and we have had the entomologists of the Department before us to report upon the work they have been doing in the way of the entomological study of the pest. But, in addition to that, and chiefly, we were very sure that the Representatives in Congress of the section most directly interested would not let us forget that this appropriation was expected, and I am sure I can speak for all the committee when I say that the action of the committee will be just as liberal, and in no way different, from what it would have been if there had been a delegation from every county in every State that is affected by this pest. The people of that region are to be congratulated upon the zeal and ability of their Representatives in Congress, which is such that they never neglect their interests, and I wish to assure you, Mr. Ransdell and gentlemen, that when we come to consider the bill in detail we will give every possible consideration to the suggestions that have been made to us here this afternoon.

Mr. RANDELL. In behalf of the delegation I wish to thank you, and to assure you that we feel quite satisfied you are going to give us every dollar you are able to give.

The CHAIRMAN. The committee will stand adjourned until a call is issued for a meeting.

INDEX.

| | Page. |
|--|------------------------------|
| Abel, Mrs. Mary H., remarks of, on nutrition investigations..... | 858 |
| Accounts and Disbursements, Division of—A. Zappone, Chief of Division, remarks of, on— | |
| Organization of the Division..... | 564 |
| Duties of Chief of Division..... | 564 |
| Amounts of receipts of Bureau of Forestry..... | 564 |
| System of audit and accounting used by Division..... | 566, 567, 575, 576, 579, 580 |
| Reports required by Congress..... | 566 |
| Cost of printing the required reports..... | 566, 568 |
| Comparison of pay of clerks of Department of Agriculture with other Departments..... | 569, 574 |
| Transfers from other Departments to Department of Agriculture, Table of..... | 574 |
| Traveling on official business..... | 577 |
| Permanent appropriations..... | 581 |
| Recommendation as to printing for Department of Agriculture..... | 581, 584 |
| Payments to experiment stations..... | 583 |
| Agricultural Experiment Stations, Office of: | |
| A. C. True, Director, remarks of, on— | |
| Proposed increases in salaries of office force..... | 627 |
| Proposed increase in lump-sum appropriation..... | 628 |
| Publications, foreign and domestic, handled annually..... | 629 |
| Experiment Station Work..... | 631 |
| Experiment Station Record..... | 631 |
| Experiment stations in Alaska, Hawaii, Porto Rico, and Guam..... | 632, 638 |
| Needs for station on island of Guam..... | 633 |
| Receipts from sale of agricultural products at stations..... | 633 |
| Farmers' Institutes..... | 634 |
| Instruction in agriculture in common schools..... | 636, 638 |
| Galloway cattle and reindeer in Alaska..... | 639 |
| Nutrition investigations..... | 647 |
| Irrigation and drainage investigations..... | 649, 660, 663, 664 |
| Reclamation Service work..... | 660 |
| Walter H. Evans, of Office of Experiment Stations, remarks of, on— | |
| Coffee in Porto Rico..... | 640 |
| Citrus fruits and pineapple growing in Porto Rico..... | 641 |
| Horses, hogs, and poultry in Porto Rico..... | 642 |
| Coffee, rice, rubber, tobacco, forage plants, etc., in Hawaii..... | 643, 645, 646 |
| Grain growing, horticulture, etc., in Alaska..... | 644 |
| Samuel Fortier, of Office of Experiment Stations, remarks of, on— | |
| Irrigation and drainage investigations..... | 652 |
| Cost of irrigation water west of the Missouri..... | 652 |
| Waste of irrigation water..... | 653 |
| Methods of irrigating..... | 654, 656, 664 |
| Demonstration work..... | 656 |
| Cooperation by States..... | 657 |
| Alkali soils, work on..... | 658 |
| Duplication of work of Bureau of Soils..... | 659 |
| C. G. Elliott, of Office of Experiment Stations, remarks of, on— | |
| Drainage investigations..... | 665 |
| Swamp lands..... | 666 |
| Areas (swamp) surveyed..... | 667, 670 |
| No actual drainage done yet..... | 667 |

| | Page. |
|--|-------------------------|
| Agricultural colleges and experiment stations: | |
| Executive committee of, as follows— | |
| H. P. White, of Georgia, president. | |
| J. S. Snyder, of Michigan, member. | |
| W. E. Stone, of Indiana, member. | |
| C. G. Curtis, of Iowa, member. | |
| Remarks of H. P. White, president, on— | |
| Work of agricultural colleges and experiment stations | 696, 698, 699 |
| History of the foundation of these institutions | 697 |
| Legislative enactments by Congress, for | 697 |
| Relations with Department of Agriculture | 698, 710 |
| Committee of investigation of methods of scientific research | 700 |
| Nutrition investigations | 700 |
| Cooperations with, and appropriations for agricultural and experi-
ment stations by the States | 701, 703, 705, 706, 710 |
| Agricultural courses in primary and secondary schools | 702, 703 |
| Agricultural colleges equipped to advise agricultural courses in schools | 702 |
| Agricultural schools in Congressional districts in Georgia | 703, 711 |
| Difficulty in providing schools with teachers of agriculture | 704 |
| Remarks of Dr. J. S. Snyder, of Michigan, on— | |
| Teaching agriculture in common schools in Michigan | 712 |
| Agriculture taught in few schools in the United States | 712 |
| Rarely able to obtain teachers competent to teach agriculture | 712, 713 |
| Courses of agriculture in Michigan schools | 714, 715 |
| Relations which ought to exist between experiment stations and De-
partment of Agriculture | 717 |
| Impossible to supply district schools with teachers of agriculture at
present | 718 |
| Remarks of Dr. W. E. Stone, of Indiana, on— | |
| Courses in agricultural college of Indiana | 719 |
| Institutes in Indiana | 719 |
| Income of Indiana experiment station | 719 |
| Demonstration work in Indiana | 719 |
| Teaching agriculture in public schools | 719 |
| Have not teachers of agriculture and public not yet ready for estab-
lishment of schools of agriculture | 720 |
| Remarks of Dr. C. G. Curtis, of Iowa, on— | |
| Courses in agriculture | 721 |
| Demonstration work | 721 |
| Not ready for legislation requiring the introduction of agriculture into
public schools | 722 |
| Animal Industry, Bureau of—remarks of Dr. A. D. Melvin, Chief of Bureau, on— | |
| Work of the Bureau | 44 |
| Inspection of vessels (and fittings) in cattle export trade | 46 |
| Insurance rates on export cattle—changes in | 47 |
| Losses of export cattle in transit | 47 |
| Work in eradicating scab and other diseases of cattle and sheep | 47, 49, 61 |
| Cooperation by States with Department of Agriculture | 48, 53, 56, 57, 891 |
| Cattle cars—cleaning and disinfecting | 52 |
| Cattle tick—progress of work on | 52 |
| area freed from | 53 |
| probable duration of work on | 55 |
| appropriation desired for work on | 55, 61, 890, 893 |
| Meat-inspection law, no changes in, desired | 70 |
| Dual-purpose cow, experiments to produce | 71 |
| Zebra hybrid or cross | 71 |
| Tuberculosis in cattle | 71, 91 |
| Federal inspection for tuberculosis in cattle | 76 |
| Federal inspection of dairy products | 79 |
| Hog cholera, treatment for | 82 |
| Crossbreeding and inbreeding | 84 |
| Blackleg | 85 |
| Appalachian and White Mountain Forest Reserves, remarks on, by— | |
| Hon. Henry Cabot Lodge, a Senator from Massachusetts | 725 |
| Hon. Andrew J. Peters, of Massachusetts | 725 |
| Hon. Hoke Smith, governor of Georgia | 727, 780 |
| Gifford Pinchot, Forester, U. S. Forest Service | 730 |

| | |
|--|--|
| Appalachian and White Mountain Forest Reserves, remarks on, by—Cont'd. | Page. |
| Philip W. Ayres, forester for Dartmouth College, etc | 732 |
| I. C. White, esq., State geologist of West Virginia | 734 |
| Frederick C. Dumaine, esq., of Massachusetts | 736 |
| A. M. Schoen, esq., of the American Institute of Electrical Engineers | 737 |
| W. S. Lee, esq., chief engineer of Southern Power Company | 742 |
| G. F. Swaine, esq., professor of civil engineering, Massachusetts | 745 |
| Hon. F. H. Gillett, a Representative from Massachusetts | 751 |
| Edwin A. Start, esq., of Massachusetts Forestry Association | 752 |
| Charles E. Waddell, esq., of Ashville (N. C.) Board of Trade | 754 |
| C. J. H. Woodbury, esq., secretary of National Association of Cotton
Manufacturers, of Boston, Mass | 756 |
| E. J. Watson, esq., commissioner of agriculture, South Carolina | 757 |
| Morris Knowles, esq., engineer in charge of filtration works, Pittsburg, Pa. | 762 |
| M. O. Leighton, esq., chief hydrographer, U. S. Geological Survey | 764 |
| Hon. Chas. M. Floyd, governor of New Hampshire | 771 |
| Wm. L. Hall, of Forest Service, U. S. Department of Agriculture | 773 |
| Chas. C. Goodrich, of Hartford, Conn., general manager of Hartford and
New York Transportation Company | 774 |
| L. C. Glenn, esq., of Vanderbilt University, Tennessee | 775 |
| Geo. B. Leighton, esq., of Monadnock, N. H. | 777 |
| Harvey N. Shepard, esq., of Boston, Mass | 778 |
| Michael F. Sullivan, esq., president of board of trade, Lawrence, Mass. | 783 |
| M. J. Hapgood, esq., of Vermont | 783 |
| Arnold, J. A., Acting Chief of Division of Publications, Department of Agri-
culture—remarks of, on work of his Division, etc | 585 |
| Beall, Hon. Jack, a Representative from Texas, remarks of, on— | |
| Weather Bureau | 3, 12, 19, 33, 34, 37, 43 |
| Bureau of Animal Industry | 79, 81, 83, 85 |
| Bureau of Plant Industry | 96, |
| 101, 102, 115, 126, 145, 146, 151, 197, 198, 202, 205, 208, 209 | |
| Forest Service | 243, 259, 264, 278, 296, 297 |
| Bureau of Chemistry | 359, 373, 383 |
| Bureau of Soils | 397, 465, 467, 470, 892 |
| Bureau of Entomology | 478, 489, 490, 494, 495, 496, 497, 498, 509, 510, 512, 513 |
| Bureau of Biology | 558 |
| Office of Experiment Stations, etc | 637, 664, 667, 708 |
| Office of Public Roads | 694 |
| Hybridization of Animals | 829 |
| Cattle tick experiments | 876 |
| Biological Survey, Bureau of—C. Hart Merriam, Chief of Bureau, remarks of,
on— | |
| Proposed increases in salaries and lump sum | 528 |
| Publications of Bureau | 529 |
| Work of Bureau, different lines of | 529, 551, 552, 554 |
| Nature of work under Lacey Act | 529 |
| Birds which feed on boll weevil | 529 |
| Bird reservations, and wardens of same | 531, 532 |
| Quail as weed consumers | 533 |
| Birds in relation to agriculture | 547 |
| Hawks and owls beneficial to agriculture | 533 |
| Field mice, gophers, ground squirrels, etc., as pests | 534, 539, 544, 549, 550 |
| Methods of destroying field mice, etc | 535 |
| Rats introducing bubonic plague | 537 |
| Rats, damage by | 542 |
| Moles, skunks, and foxes beneficial to agriculture | 539, 548, 553 |
| Rabbits | 539 |
| Wolves | 540, 546 |
| English sparrows | 541 |
| Losses by pests, estimated | 545, 549, 550, 563 |
| Raising deer for market | 546 |
| Ridding premises of rats | 542, 550 |
| Mammals generally pests | 552 |
| Necessary qualifications for naturalist in Biological Survey | 554 |
| Practical use of life and crop zone maps | 555, 558 |
| Cooperation with other Bureaus of Department of Agriculture | 555 |
| Bonsteel, Jay A., of Bureau of Soils, remarks of, on work in soil utilization .. | 450 |

| | |
|--|---|
| Chemistry, Bureau of—remarks of Dr. Harvey W. Wiley, chief of Bureau, on— | |
| Proposed increases in certain salaries in the Bureau..... | 348 |
| Proposed increases in force of Bureau..... | 348 |
| Proposed changes in force of Bureau..... | 349 |
| Work of the Bureau..... | 350 |
| Chemistry work for other Departments..... | 350 |
| Testing paper and new materials for paper making..... | 351 |
| Chemists in other Departments..... | 352 |
| Chemists in other Bureaus of Department of Agriculture..... | 352, 355 |
| Possibility of centralization of all chemistry work in Department of Agriculture..... | 353 |
| Proposed increase in lump-sum appropriation for the Bureau..... | 353 |
| New laboratories necessary at certain ports of entry..... | 354, 356 |
| Method of inspecting imports..... | 354, 357 |
| Adulteration of milk..... | 358 |
| Methods of prosecution under pure-food law..... | 359 |
| Description of inspection system under pure-food law..... | 361 |
| Appointment of pure-food law inspectors..... | 361 |
| Duties of pure-food law inspectors..... | 362, 365 |
| Cooperation of State authorities in execution of pure-food laws..... | 363 |
| Employment and compensation of State chemists..... | 364 |
| States having pure-food laws..... | 365 |
| Experiments in sirup manufacture..... | 367 |
| Preservatives and colorings in foods, fruits, etc..... | 368, 384 |
| Investigations in dairy chemistry..... | 370, 385 |
| Adulterated and renovated butter..... | 370 |
| Drying fruits..... | 371, 382 |
| Investigations in regard to effects of cold storage on foods, etc..... | 373 |
| Preservation of unfermented fruit juices..... | 376 |
| Effects of preservatives on human health..... | 386 |
| Manufacture of alcohol on the farm..... | 388 |
| Cattle tick, work to eradicate, remarks on, by— | |
| Hon. Joseph E. Ransdell, a Representative from Louisiana..... | 862 |
| Hon. George S. Legare, a Representative from South Carolina..... | 864, 889 |
| Hon. E. S. Candler, a Representative from Mississippi..... | 869 |
| Hon. Thomas Hackney, a Representative from Missouri..... | 871 |
| Hon. Wm. R. Smith, a Representative from Texas..... | 872 |
| Judge S. H. Cowan, attorney for American National Live Stock Association..... | 873 |
| Murdo McKenzie, vice-president of American National Live Stock Association..... | 877 |
| Hon. John C. Floyd, a Representative from Arkansas..... | 878 |
| Wilfred Linton, State veterinarian of Arkansas..... | 879 |
| Hon. Chas. R. Thomas, a Representative from North Carolina..... | 884, 897 |
| Hon. John T. Watkins, a Representative from Louisiana..... | 886 |
| Hon. Wyatt Aiken, a Representative from South Carolina..... | 889 |
| Dr. A. D. Melvin, Chief of Bureau of Animal Industry..... | 890 |
| Cameron, F. K., of Bureau of Soils—remarks of, on mineral chemistry of the soil..... | 443 |
| Clark, Charles C., Acting Chief of Bureau of Statistics—remarks of, on work of Bureau..... | 597 |
| Curtis, Dr. C. G., of Iowa Agricultural College—remarks of, on agricultural colleges..... | 721 |
| Cocks, Hon. William W., a Representative from New York, remarks of, on— | |
| Bureau of Animal Industry..... | 76, 77, 82 |
| Bureau of Plant Industry..... | 106, |
| 107, 108, 161, 169, 170, 177, 178, 179, 188, 197, 211, 212, 220 | |
| Forest Service..... | 244, 246, 247, 259, 276 |
| Bureau of Chemistry..... | 352, 362, 366, 368, 369, 371, 385, 388 |
| Bureau of Soils..... | 438, 440, 441, 448, 457, 834, 836, 841, 842 |
| Bureau of Entomology..... | 473, 508, 525 |
| Bureau of Biology..... | 553 |
| Division of Accounts..... | 580 |
| Office of Experiment Stations..... | 632, 633, 646 |
| Office of Public Roads..... | 675, 677, 678, 679, 680, 687 |
| Agricultural colleges, etc..... | 705, 706 |
| Appalachian and White Mountain forest reserves..... | 744 |

| | Page |
|---|---|
| Cole, Hon. Ralph D., a Representative from Ohio, remarks of, on— | |
| Bureau of Animal Industry | 70 |
| Bureau of Plant Industry | 215, 227, 228, 231, 233, 237 |
| Bureau of Soils | 432, 438, 443, 458 |
| Appalachian and White Mountain forest reserves | 748, 749, 750 |
| Cook, Hon. Geo. W., a Representative from Colorado, remarks of, on— | |
| Weather Bureau | 8, 11, 38, 39, 40 |
| Bureau of Animal Industry | 51, 73, 90 |
| Bureau of Plant Industry | 98, 108, 109, 124, 126, 136, 140, 150, 159, 204, 208; 211, 238 |
| Forest Service | 247, 251, 253, 254, 255, 261, 262, 263, 265, 266, 268, 283, 286, 287, 288, 291, 292, 297, 327 |
| Bureau of Chemistry | 355, 356, 357, 359, 364, 366, 372, 373, 383, 389, 390 |
| Bureau of Soils | 408, 435, 449, 450, 456, 467, 468, 470, 837 |
| Bureau of Entomology | 475, 477 |
| Bureau of Biology | 554, 562 |
| Bureau of Statistics | 615 |
| Office of Experiment Stations | 642, 649, 650, 651 |
| Office of Public Roads | 688, 689, 693, 694, 695 |
| Appalachian and White Mountain forest reserves | 761, 762 |
| Hybridization of animals | 830 |
| Cattle-tick eradication work | 893 |
| Dearbin, Col. Thomas H., superintendent of gypsy-moth work in New Hampshire, remarks of, on gypsy-moth work | 854 |
| Entomology, Bureau of—Dr. L. O. Howard, Chief of Bureau, remarks of, on— | |
| Work of Bureau, generally | 471 |
| Estimates for 1908-9 and new projects | 471 |
| Investigation of insects injurious to tobacco | 486 |
| Cooperation of State stations with Bureau | 486, 488, 520 |
| Utilization of Farmers' Bulletins by farmers | 487 |
| Value of demonstration work | 487 |
| The green-bug | 488 |
| Method and cost of combating green-bug | 488, 491 |
| Parasite of green-bug | 488 |
| Salaries paid to State officials by Department of Agriculture | 492 |
| The chinch bug | 497 |
| The gypsy and brown-tail moths | 513 |
| States affected by gypsy and brown-tail moths | 513 |
| Spread of gypsy and brown-tail moths | 514 |
| Appropriations by Massachusetts to suppress gypsy and brown-tail moths | 515 |
| Parasites of gypsy and brown-tail moths | 517 |
| Cattle-tick work in cooperation with Bureau of Animal Industry | 520 |
| C. L. Marlatt, Assistant Chief of Bureau of Entomology, remarks of, on— | |
| White fly, an enemy of citrus fruits | 472 |
| Methods of combating white fly | 473 |
| Cooperation of States with Bureau | 478 |
| Value of Florida orange crop | 479 |
| The green-bug | 492 |
| A. L. Quaintance, of Bureau of Entomology, remarks of, on— | |
| Grape diseases | 480 |
| Methods of combating grape diseases | 482 |
| Cooperation of States with Bureau | 483 |
| "Thrips" a disease of pear, peach, plum, cherry, etc. | 484 |
| Method of combating "Thrips" | 484 |
| States not cooperating with Bureau | 485 |
| W. D. Hunter, of Bureau of Entomology, remarks of, on— | |
| Cotton-boll weevil, history and spread of | 499, 512 |
| Methods of combating cotton-boll weevil | 499, 506, 508, 509 |
| Native parasites of | 500, 506 |
| Cooperation of Mexican Government | 501 |
| Cooperation of States with Bureau | 510, 511 |
| Men in field work and nature of their employment | 505, 507 |
| Cattle-tick work | 520 |
| Life history of cattle tick | 521 |
| Parasites of cattle tick | 522 |
| A. D. Hopkins, of Bureau of Entomology, remarks of, on— | |
| Forest insects | 522 |
| Estimate of stumpage in United States | 523 |

| | Page. |
|---|--|
| A. D. Hopkins, of Bureau of Entomology, remarks of, on—Continued. | |
| Estimate of loss caused by forest insects..... | 523 |
| Insect depredations in Black Hills, South Dakota..... | 524 |
| Parasites of destructive timber beetles..... | 525 |
| Ellsworth, Hon. Rufus M., of New Hampshire, remarks of, on gypsy-moth work. | 885 |
| Evans, Walter H., of Office of Experiment Stations, remarks of, on work of the Office..... | 640 |
| Elliott, C. G., of Office of Experiment Stations, remarks of, on work of the Office..... | 665 |
| Forest Service—Gifford Pinchot, Forester, remarks of, on— | |
| Proposed increases in certain salaries in Forest Service..... | 240, 346 |
| Proposed increases in clerical force in Forest Service..... | 241 |
| Forestry work in Department of Agriculture from its inception to present..... | 243 |
| Consolidation of all forestry work in Department of Agriculture..... | 244 |
| Present organization of Forest Service..... | 244, 269 |
| Stores and supplies used in Forest Service in the field..... | 247 |
| Horses used by forest rangers..... | 247 |
| Methods of keeping accounts of Forest Service..... | 247, 328 |
| Daily balance sheet of Forest Service..... | 248, 328 |
| Engineering and lands..... | 248 |
| Water power companies in national forests..... | 249 |
| Homesteads in national forests..... | 256, 260, 263, 265 |
| The "lien land law," and why repealed..... | 258 |
| Settlers cooperating to prevent forest fires..... | 259 |
| Roads in national forests..... | 259, 299 |
| Homesteaders in national forests allowed to cut timber..... | 261, 265, 266 |
| Acreage of national forests..... | 267 |
| Sales of timber in national forests, how made..... | 267 |
| Grazing in national forests..... | 269, 280, 346 |
| Products from waste (by wood chemistry) in national forests..... | 271 |
| Timber tests, etc..... | 272 |
| Wood preservatives and methods of using..... | 273, 277 |
| Methods of disseminating results of experiments..... | 276, 294, 298 |
| Method of handling national forests..... | 278 |
| Forest officers, and duties of..... | 278 |
| Wars between cattle and sheep men in national forests..... | 281 |
| Charge for grazing and authority for making same..... | 282, 346 |
| Summary of receipts from national forests from July 1, 1906, to June 30, 1907..... | 289 |
| Receipts and expenditures 1899 to 1908..... | 290 |
| Census of timber products in United States..... | 292 |
| Increase in stumpage price..... | 293 |
| Method of helping private owners of forest lands..... | 294 |
| Appalachian and White Mountain forests..... | 295, 327 |
| Destructive lumbering versus forestry..... | 297 |
| Forest fires, losses by..... | 299 |
| Estimates \$2,000,000 for year ending June 30, 1909..... | 326 |
| Detailed estimate of sums to be spent in each forest..... | 300 |
| Value of national forests (land and timber)..... | 328 |
| Efficiency report..... | 330 |
| Cooperation with other Federal bureaus..... | 341 |
| Advances of money to forest officers for certain purposes..... | 344 |
| Purchase of books, etc., for national forest officers..... | 345 |
| Fortier, Samuel, of Office of Experiment Stations, remarks of, on work in his Office..... | 652 |
| Gypsy moth, eradication of, remarks on, by— | |
| Hon. E. W. Roberts, a Representative from Massachusetts..... | 856 |
| Prof. A. H. Kirkland, of Massachusetts..... | 848 |
| Prof. E. P. Hilchings, of Maine..... | 851 |
| Col. Thos. H. Dearbin, of New Hampshire..... | 854 |
| Hon. Rufus M. Ellsworth, of New Hampshire..... | 855 |
| Galloway, Beverly T., Chief of Bureau of Plant Industry, remarks of, on work of Bureau..... | 92 |
| Gilhams, Hon. Clarence C., a Representative from Indiana, remarks of, on— | |
| Bureau of Animal Industry..... | 81, 83 |
| Bureau of Plant Industry..... | 106, 107, 108, 122, 123, 129, 132, 134, 135, 145, 147, 174, 180, 181, 183, 184, 188, 216, 227, 232 |

Page

| | |
|--|--|
| Gilhams, Hon. Clarence C, a Representative from Indiana, remarks of, on—Continued. | |
| Bureau of Forestry | 263, 347 |
| Bureau of Soils | 433, 434, 435, 436, 443, 450, 456 |
| Bureau of Entomology | 480, 482, 483, 497, 524 |
| Bureau of Biology | 545, 561 |
| Office of Experiment Stations | 658, 659, 661, 663 |
| Office of Public Roads | 676, 681, 691 |
| Agricultural colleges, etc. | 714, 715, 718 |
| Hybridization of animals | 831 |
| Gypsy moth work | 850 |
| Hybridization of animals, remarks on by C. J. (Buffalo) Jones | 824 |
| Hitchings, Prof. E. P., of Maine, remarks of, on gypsy moth | 851 |
| Howard, Dr. L. O., Chief of Bureau of Entomology, remarks of, on work of his Bureau | 471 |
| Hopkins, A. D., of Bureau of Entomology, remarks of | 522 |
| Hunter, W. D., of Bureau of Entomology, remarks of | 499 |
| Hawley, Hon. Willis C., a Representative from Oregon, remarks of, on— | |
| Weather Bureau | 14, 17, 20, 23, 30, 33, 36, 40 |
| Bureau of Animal Industry | 45, 47, 56, 59, 62, 64, 66, 68, 70, 71, 72, 74, 81 |
| Bureau of Plant Industry | 97, 99, 107, 109, 122, 128, 135, 136, 137, 139, 142, 143, 146, 147, 148, 149, 150, 151, 152, 158, 164, 166, 174, 178, 179, 180, 181, 186, 190, 212, 214, 215, 218, 219, 220, 221, 227, 230, 237, 243 |
| Forest Service | 240, 246, 247, 249, 252, 253, 254, 255, 256, 257, 258, 259, 261, 262, 264, 265, 266, 267, 273, 274, 275, 278, 282, 286, 287, 288, 291, 293, 295, 299, 344, 345, 346, 347 |
| Bureau of Chemistry | 350, 353, 357, 360, 361, 367, 368, 374, 375, 377, 378, 382, 388, 389, 390 |
| Bureau of Soils | 393, 396, 398, 399, 403, 404, 411, 413, 414, 415, 420, 432, 441, 442, 447, 450, 839, 840, 841, 842 |
| Bureau of Entomology | 473, 475, 478, 479, 482, 483, 484, 485, 515, 517, 518, 519, 521, 522, 523, 524, 525 |
| Office of Experiment Stations | 636, 637, 639, 640, 654, 658, 660, 661, 662, 663, 664, 666, 667, 670 |
| Agricultural colleges | 702, 704, 710, 711 |
| Appalachian and White mountains forests | 744, 749, 753, 761, 769, 770 |
| Hybridization of animals | 830 |
| Gypsy moth work | 850, 851, 855, 856 |
| Haskins, Hon. Kittredge, a Representative from Vermont, remarks of, on— | |
| Weather Bureau | 5, 6, 7, 8, 18, 22 |
| Bureau of Animal Industry | 52, 61, 63, 64, 66 |
| Appalachian and White mountains forests | 725, 728, 737, 747, 750, 761, 768, 769, 784 |
| Haugen, Hon. Gilbert N., a Representative from Iowa, remarks of, on— | |
| Bureau of Plant Industry | 171, 172, 177, 178, 179, 180, 185, 186 |
| Bureau of Chemistry | 350, 353, 356, 361, 371, 390 |
| Bureau of Entomology | 483, 485, 488 |
| Bureau of Biology | 541, 543, 544 |
| Bureau of Statistics | 609, 619, 620 |
| Office of Public Roads | 692, 693, 694, 695 |
| Agricultural Colleges, etc | 705 |
| Appalachian and White mountains forests | 761, 771 |
| Heflin, Hon. J. T., a Representative from Alabama, remarks of, on— | |
| Bureau of Animal Industry | 53, 54, 55, 84 |
| Bureau of Plant Industry | 102, 105, 108, 109, 115, 130, 184, 187, 197, 208, 216, 224, 237 |
| Bureau of Chemistry | 351, 358, 359, 360, 362, 365, 370, 373, 375 |
| Bureau of Soils | 402, 838 |
| Bureau of Entomology | 483 |
| Bureau of Biology | 534, 542, 543 |
| Bureau of Statistics | 608, 609, 610, 611, 612, 613, 614, 615, 666, 617, 618, 619, 620, 625 |
| Office of Public Roads | 685, 687, 690, 691, 693, 694, 695 |
| Agricultural colleges, etc. | 711, 718, 720 |
| Jones, C. J. (Buffalo Jones), remarks of, on hybridizations of cattle and sheep, etc | 824 |

| | Page. |
|---|--|
| Jacobs, Miss Emma S., of Washington, D. C., remarks of, on nutrition investigations | 860 |
| Kirkland, Prof. A. H., of Massachusetts, remarks of, on gypsy moth work | 848 |
| Knapp, S. A., of Bureau of Plant Industry, remarks of, on demonstration work in boll-weevil States | 193 |
| Kober, Dr. Geo. M., of Georgetown University, District of Columbia, remarks of, on nutrition investigations | 859 |
| Lamb, Hon. John, a Representative from Virginia, remarks of, on— | |
| Weather Bureau | 10, 17, 24, 30, 32, 36, 37, 43 |
| Bureau of Animal Industry | 53, 55, 56, 58, 59, 62, 69, 70, 71, 76, 77, 84, 85 |
| Bureau of Plant Industry | 122, 124, 125, 127, 130, 134, 135, 136, 163, 164, 165, 171, 174, 184, 188, 192, 197, 200, 212, 222, 224, 225, 227, 229, 230, 232, 233, 234, 237 |
| Forest Service | 247, 266, 267, 268, 292 |
| Bureau of Chemistry | 358, 381, 383, 387, 388, 389, 390 |
| Bureau of Soils | 396, 411, 414, 415, 418, 419, 420, 421, 422, 467, 833, 836 |
| Bureau of Entomology | 525 |
| Bureau of Biology | 562 |
| Division of Accounts | 574, 577, 584 |
| Division of Publications | 587, 592, 593 |
| Bureau of Statistics | 612, 615, 625, 626 |
| Office of Experiment Stations | 648, 659, 667, 670 |
| Hybridization of animals | 828 |
| Lever, Hon. A. F., a Representative from South Carolina, remarks of, on— | |
| Weather Bureau | 5, 11, 12, 14, 15, 18, 29, 30, 31, 32 |
| Bureau of Animal Industry | 45, 53, 54, 58, 59, 60, 61, 63, 70, 76, 80, 82 |
| Bureau of Plant Industry | 94, 95, 100, 101, 103, 104, 119, 123, 124, 126, 127, 137, 138, 148, 152, 153, 154, 155, 165, 167, 169, 185, 186, 187, 188, 189, 190, 197, 198, 200, 214, 222, 225, 236 |
| Forest Service | 253, 254, 257, 258, 256, 260, 264, 267, 271, 275, 288, 296, 328 |
| Bureau of Chemistry | 353, 356, 361, 362, 363, 378, 382, 388, 389 |
| Bureau of Soils | 398, 401, 402, 407, 409, 410, 411, 418, 425, 428, 436, 437, 461, 469, 833, 839 |
| Bureau of Entomology | 473, 478, 479, 483, 486 |
| Bureau of Biology | 531, 532, 542, 543, 544, 545, 548, 551, 562, 563 |
| Bureau of Statistics | 604, 605, 608, 610, 612, 615, 617, 619, 620, 621 |
| Office of Experiment Stations | 637, 653, 657, 658, 660, 661, 662, 663, 670, 671 |
| Office of Public Roads | 676, 684, 694 |
| Agricultural colleges, etc. | 703, 704, 708, 709, 711, 713, 717, 718, 720 |
| Appalachian and White Mountain forests | 724, 740, 745, 749, 750, 754, 773 |
| Hybridization of animals | 827, 828 |
| Cattle-tick work | 868, 875, 876, 889, 890, 891, 892, 893 |
| Madison, Hon. E. H., a Representative from Kansas, remarks of, on Weather Bureau stations | 21 |
| Marlatt, C. L., of Bureau of Entomology, remarks of, on work of Bureau | 472 |
| Melvin, Dr. A. D., Chief of Bureau of Animal Industry, remarks of, on work of Bureau | 44 |
| Merriam, Dr. C. Hart, Chief of Bureau of Biology, remarks of, on work of Bureau | 528 |
| Moore, Prof. Willis L., Chief of Weather Bureau, remarks of, on work of Bureau | 1 |
| McLaughlin, Hon. J. C., a Representative from Michigan, remarks of, on— | |
| Weather Bureau | 3, 9, 19, 20, 22, 24, 28, 30, 33, 39, 43 |
| Bureau of Animal Industry | 80 |
| Bureau of Plant Industry | 118, 122, 137, 159, 160, 170, 174, 181, 184 |
| Forest Service | 252, 255, 256, 257, 260, 261, 268, 271, 275, 276, 277, 286, 287, 289, 291, 297, 298, 328, 329, 342, 346 |
| Bureau of Chemistry | 360, 368, 369, 370, 371, 383, 387, 390 |
| Bureau of Soils | 400, 453, 832 |
| Bureau of Entomology | 477, 478, 488, 511, 515, 516, 517, 524 |
| Bureau of Biology | 534, 537, 542, 559, 561 |
| Office of Experiment Stations | 637, 657, 662, 663, 665, 666, 667, 669, 671 |
| Office of Public Roads | 682, 683, 691 |
| Agricultural colleges, etc. | 711 |
| Cattle-tick work | 867 |

| | Page. |
|---|---------------|
| Nutrition investigations, remarks on, by— | |
| Dr. A. C. True, Director of Experiment Stations..... | 647 |
| Mrs. Mary H. Abel, of Baltimore, Md..... | 858 |
| Dr. George M. Kober, of Washington, D. C..... | 859 |
| Miss Emma S. Jacobs, of Washington, D. C..... | 860 |
| Page, L. W., Director of Office of Public Roads, remarks of, on work of the
Office..... | 673 |
| Pinchot, Gifford, Forester and Chief of Forest Service, remarks of, on— | |
| Work of Forest Service..... | 240 |
| Appalachian and White Mountain forests..... | 730 |
| Plant Industry, Bureau of—C. D. Galloway, Chief of Bureau, remarks of, on— | |
| Office and field force, work of Bureau, projects, etc. 92, 94, 96, 116, 129, 165, 172 | |
| Annual report, delay in printing..... | 94 |
| Cotton—varieties, breeding, selection, diseases, etc. 94, 100, 104, 126, 137 | |
| Cooperative work with other bureaus of the Department..... | 96, 117 |
| Diseases of plants, fruits, trees, etc..... | 96, 99 |
| Duplication of work done in other bureaus..... | 97 |
| Distillation of the waste from sawmills..... | 97 |
| Fence posts—protection from decay..... | 98 |
| Peruvian and Manchurian alfalfas..... | 99, 106 |
| Cotton (Egyptian) imported..... | 104 |
| Alfalfa, machines for curing..... | 109 |
| Tobacco work..... | 110, 115, 119 |
| Experiment stations, cooperative work done by..... | 113, 128, 140 |
| Corn, breeding, selection, grading, experiments with, etc. 120, 129 | |
| Wheat, varieties, breeding, diseases, etc..... | 127, 132 |
| Asparagus, varieties, breeding, diseases, etc..... | 127 |
| Fertilizer from rocks, etc..... | 129 |
| Nitrogen bacteria, etc..... | 130 |
| Water contamination and purification..... | 133, 139 |
| Coffee and cacao, varieties, breeding, diseases, selection, etc..... | 140 |
| Rubber, and substitutes for..... | 141 |
| Drug and poisonous plant investigations..... | 141, 147, 149 |
| Camphor, growing and manufacturing..... | 141 |
| Hops, growing and curing..... | 143, 147 |
| Alcohol, sources, manufacturing, and using..... | 144 |
| Loco weeds, losses from..... | 149 |
| Tea culture..... | 152 |
| Farm and other machinery and apparatus..... | 162, 163, 164 |
| Grain grading, and devices for..... | 166, 212 |
| Seed adulterations, authority of Secretary of Agriculture to report on..... | 169 |
| Ramie, machine for decorticating..... | 170 |
| Grasses for different purposes..... | 172, 173 |
| Transfer of certain specimens to National Museum..... | 173 |
| Dry land agriculture, etc..... | 217, 218 |
| Cooperation with experiment stations..... | 217 |
| Dry lands, location of..... | 217 |
| Products of experimental farms, disposal of..... | 219 |
| Grain standardization..... | 220 |
| Sugar-beet work..... | 231 |
| Fruit investigation work..... | 234 |
| Seed investigations..... | 235 |
| Woods, Albert F., assistant chief of Bureau of Plant Industry, remarks of, on— | |
| Cotton, breeding and selection..... | 95 |
| Physical laboratory of Bureau..... | 156 |
| Soil solution and similar work by Bureau of Soils..... | 157 |
| Study of commercial fertilizers..... | 158 |
| Application of electricity to plant growing..... | 158, 160 |
| Farm and other machinery and apparatus for experiments..... | 161 |
| Patents on same taken in name of United States..... | 167 |
| Illustrations for the Bureau's publications, etc..... | 166 |
| Grain-standardizing apparatus..... | 167 |
| Cotton grading..... | 168 |
| Fiber-plant investigations..... | 169 |
| Plants for paper making..... | 171 |
| Flax industry..... | 171 |

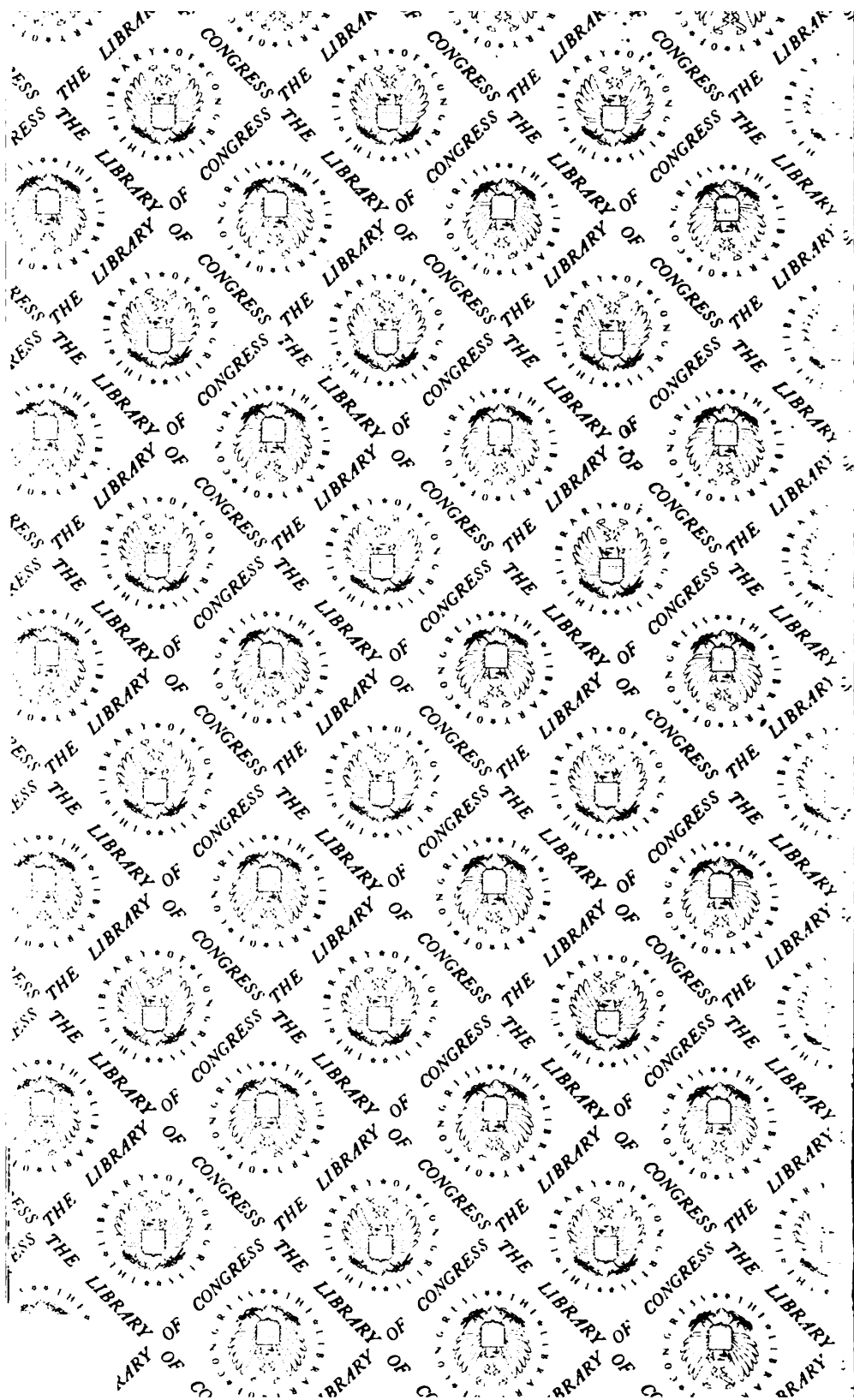
| | Page. |
|--|--|
| Woods, Albert F., assistant chief of Bureau of Plant Industry, remarks of, on—Continued. | |
| Cactus as a forage crop..... | 190, 191 |
| Grain grading..... | 212 |
| Wheat and other grains, varieties introduced..... | 213 |
| Durum wheat..... | 215 |
| Sorghum, grain-bearing..... | 216 |
| Dry land farming..... | 217 |
| Egyptian cotton..... | 220 |
| Grain standardization..... | 220 |
| Spillman, W. J., of Bureau of Plant Industry, remarks of, on— | |
| Grasses..... | 174, 188 |
| Farm management work..... | 175, 183 |
| Beets as cattle and hog feed..... | 179 |
| Summer fallowing..... | 179, 183 |
| Farmers' Institute work..... | 182 |
| Demonstration work..... | 182 |
| Johnson grass..... | 185, 187 |
| Quack grass..... | 185 |
| Canada thistle and wild onion or garlic..... | 186 |
| Poison ivy, or poison oak..... | 186 |
| Hay and haymaking..... | 187 |
| Alfalfa..... | 187, 188, 189 |
| Grass, timothy..... | 188 |
| Bermuda..... | 188 |
| Pollard, Hon. Ernest M., a Representative from Nebraska, remarks of, on— | |
| Weather Bureau..... | 4, 6, 7, 12, 13, 16, 18, 20, 22, 25, 31, 42 |
| Bureau of Animal Industry..... | 48, 49, |
| 50, 51, 62, 63, 66, 72, 73, 74, 79, 82, 83, 84, 85, 86, 87, 91 | |
| Bureau of Plant Industry..... | 98, 103, 105, |
| 109, 114, 115, 120, 121, 122, 124, 125, 132, 133, 137, 139, 140, 151, | |
| 154, 155, 156, 157, 158, 161, 162, 164, 166, 171, 173, 181, 182, 184, | |
| 185, 189, 191, 192, 197, 199, 200, 201, 202, 206, 207, 208, 210, 211 | |
| Forest Service..... | 260, 262, |
| 263, 266, 273, 274, 276, 277, 282, 283, 286, 287, 288, 289, 291, | |
| 293, 294, 295, 298, 326, 327, 328, 329, 342, 343, 344, 346, 347 | |
| Bureau of Chemistry..... | 352, 353, |
| 355, 356, 357, 360, 362, 364, 365, 374, 375, 376, 377, 378, 379, 380, 389, 390 | |
| Bureau of Soils..... | 393, 394, 397, 401, 402, 403, 404, 405, |
| 407, 408, 409, 412, 413, 414, 420, 422, 424, 425, 426, 431, 432, 433, 437, 438, | |
| 440, 441, 447, 448, 449, 451, 452, 453, 454, 455, 456, 457, 461, 470, 838, 839 | |
| Bureau of Entomology..... | 475, 476, |
| 477, 478, 484, 486, 489, 491, 493, 494, 495, 507, 509, 516, 519, 520, 522, 524 | |
| Bureau of Biology..... | 552, 553, 554, 557, 559, 560, 561 |
| Division of Accounts..... | 566, 576, 577, 578, 581 |
| Division of Publications..... | 588, 589, 590, 591, 592, 593, 594, 596 |
| Office of Public Roads..... | 675, 676, 677, 680, 681, 682, 684, 690, 691, 692 |
| Office of Experiment Stations..... | 628, 629, |
| 630, 631, 632, 633, 634, 635, 654, 655, 656, 657, 661, 662, 666 | |
| Agricultural colleges, etc..... | 701, 704, 706, 707, 708, 709, 710, 714, 717, 720 |
| Appalachian and White mountain forests..... | 740, 741, |
| 749, 750, 751, 760, 768, 769, 770 | |
| Hybridization of animals..... | 828-829 |
| Cattle-tick work..... | 864, 866, 868, 885, 891, 892, 895 |
| Publications, Division of—Jos. A. Arnold, acting chief, remarks of, on— | |
| Proposed increases in certain salaries in the Division..... | 585 |
| Work of the Division..... | 586 |
| Proposed increase in working force, promotions, etc..... | 587, 592, 597 |
| Delays in printing..... | 588 |
| Necessity for additional photographers, draftsmen, etc..... | 590, 591 |
| Applicants for Farmers' Bulletins..... | 592 |
| Preparation of Farmers' Bulletins..... | 592 |
| Addressing machine, purchase of..... | 593, 595 |
| Temporary employment of artists, draftsmen, etc..... | 595 |
| Rent of buildings, etc..... | 595 |
| Quaintance, A. L., of Bureau of Entomology, remarks of, on work of the Bureau. | |

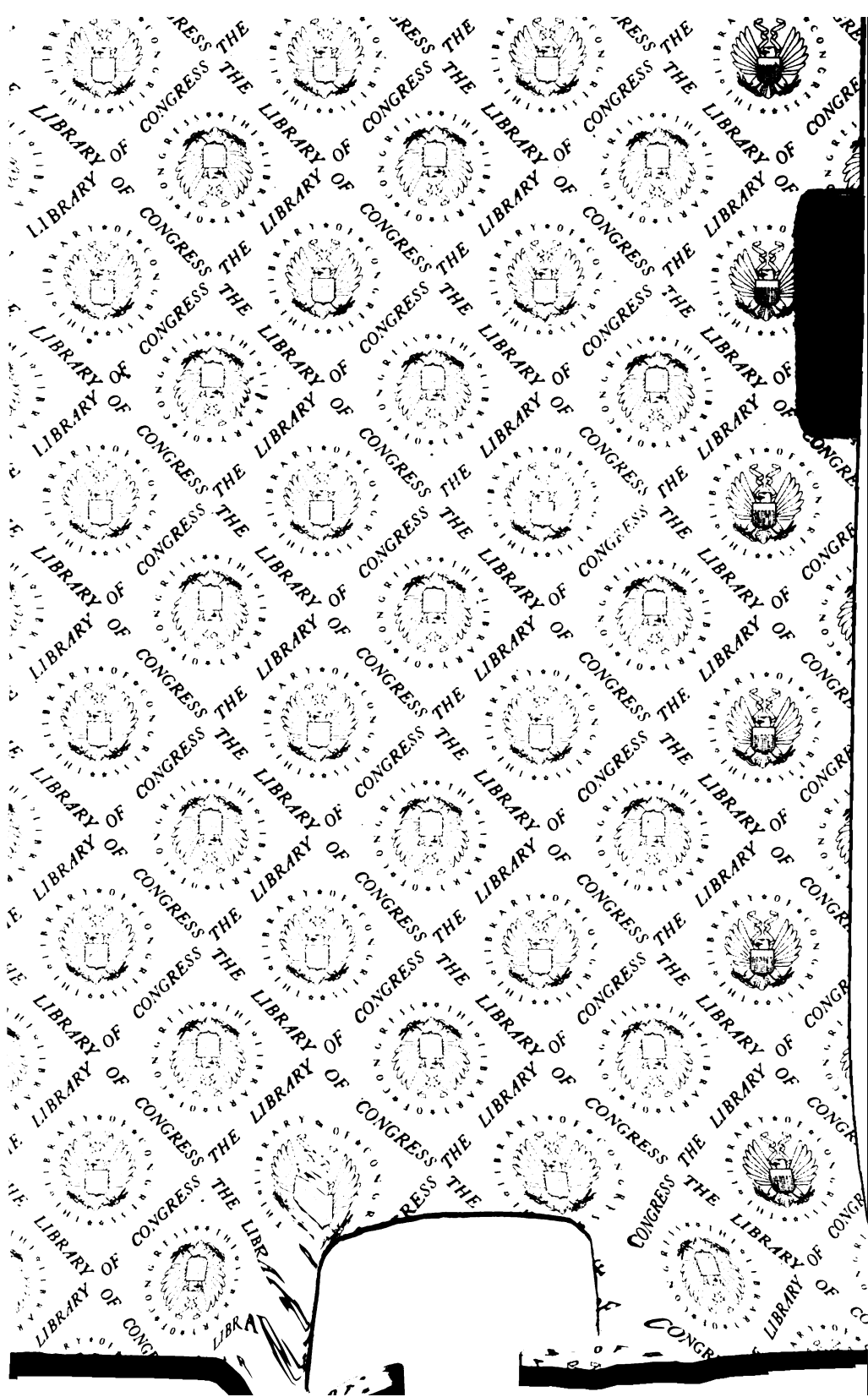
| | Page. |
|---|---|
| Roads, Office of Public—L. W. Page, chief of office, remarks of, on— | |
| Organization and work of office..... | 673 |
| Methods of work..... | 674, 690, 693 |
| Projects..... | 675 |
| Types and cost of roads..... | 676, 680, 682 |
| Maintaining and repairing roads..... | 677 |
| How automobiles hurt roads..... | 679 |
| Oil treatment of roads..... | 680 |
| Road-making machinery owned and rented by Department..... | 683, 691, 692 |
| Object-lesson roads built during current fiscal year..... | 684, 693, 694 |
| Amounts contributed by Government for building object-lesson roads.... | 685 |
| Practical results of model road building..... | 687 |
| Appropriations by Commonwealth of Massachusetts for road building from
1894 to 1907..... | 689 |
| Cooperation of communities, counties, etc..... | 694 |
| Robinson, Hon. Jos. T., a Representative from Arkansas, remarks of, on reclama-
 tion of swamp lands..... | 526 |
| Roberts, Hon. E. W., a Representative from Massachusetts, remarks of, on
 gypsy-moth eradication work..... | 856 |
| Rucker, Hon. W. W., a Representative from Missouri, remarks of, on— | |
| Weather Bureau..... | 5, 12, 15, 16, 17, 19, 20, 24, 35, 40, 41, 42, 43 |
| Bureau of Animal Industry..... | 52, 56, 57, 58, 59, 61, 62, 63, 64, 65, 66, 67, 71, 81, 83, 85 |
| Bureau of Plant Industry..... | 118, 122, 124, 130, 137, 185, 186, 208, 237, 238 |
| Forest Service..... | 266 |
| Bureau of Biology..... | 532, 533, 537, 538, 539, 540, 542, 544, 545, 551 |
| Division of Accounts..... | 568 |
| Bureau of Statistics..... | 604 |
| Office of Public Roads..... | 675, 676, 677, 679, 685, 690 |
| Cattle-tick work..... | 881 |
| Scott, Hon. Charles F., a Representative from Kansas, and chairman of Com-
 mittee on Agriculture, House of Representatives—introductory and other
 remarks and interrogations in the hearings on— | |
| Weather Bureau..... | 1, 2, 4, 5, 6, 7, 8, 9, 10, 11, 12,
13, 14, 17, 18, 20, 21, 22, 23, 25, 26, 27, 28, 29, 32, 34, 35, 37, 38, 39, 40, 42, 43 |
| Bureau of Animal Industry..... | 44, 45, 46, 47, 48, 50, 52, 53, 54, 55, 56, 59,
60, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 73, 74, 75, 77, 78, 80, 81, 82, 84, 85, 91 |
| Bureau of Plant Industry..... | 92, 93,
94, 95, 97, 99, 102, 103, 104, 105, 107, 109, 110, 111, 112, 113, 116, 117, 118,
119, 120, 121, 122, 123, 125, 126, 127, 128, 130, 131, 134, 135, 136, 137, 138,
140, 141, 142, 144, 145, 146, 147, 148, 150, 152, 153, 154, 157, 158, 159, 161,
163, 164, 165, 168, 169, 170, 171, 172, 175, 182, 185, 189, 190, 191, 192, 199,
200, 201, 203, 205, 206, 207, 208, 209, 212, 213, 214, 215, 216, 217, 218, 219,
220, 221, 222, 223, 224, 225, 226, 228, 229, 230, 231, 233, 236, 237, 238, 239 |
| Forest Service..... | 240, 241, 242, 243, 245, 249, 250, 251, 252, 253, 254, 255, 256, 257, 259,
260, 261, 262, 263, 264, 265, 267, 268, 269, 270, 273, 274, 276, 281, 283, 286,
287, 288, 292, 297, 299, 326, 327, 328, 340, 341, 342, 343, 344, 345, 346, 347 |
| Bureau of Chemistry..... | 347, 348,
349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 366,
367, 368, 369, 370, 372, 373, 374, 376, 378, 379, 382, 384, 385, 386, 387, 389 |
| Bureau of Soils..... | 391, 393, 397, 398, 399, 400, 401, 402, 403, 405,
406, 407, 408, 409, 410, 412, 415, 416, 417, 418, 419, 421, 422, 423, 424, 425,
426, 427, 429, 434, 437, 439, 440, 441, 442, 443, 444, 445, 446, 447, 452, 453,
455, 458, 459, 460, 461, 465, 467, 468, 469, 470, 833, 834, 835, 836, 837, 842 |
| Bureau of Entomology..... | 471, 472, 473, 474, 475, 476, 477, 478, 479, 481, 482, 483,
484, 485, 486, 487, 488, 489, 490, 491, 492, 494, 495, 497, 498, 500, 501, 504,
505, 506, 507, 508, 509, 510, 511, 513, 515, 516, 517, 518, 519, 520, 522, 525 |
| Bureau of Biology..... | 528, 529, 530, 531, 533, 535, 536, 538, 540,
543, 544, 545, 546, 548, 549, 551, 552, 553, 554, 555, 556, 557, 559, 563 |
| Division of Accounts..... | 564, 565,
566, 567, 568, 570, 574, 575, 576, 577, 578, 579, 581, 582, 583, 584, 585 |
| Division of Publications..... | 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596 |
| Bureau of Statistics..... | 59, 605, 606, 607, 608,
609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 621, 622, 623, 624, 625, 626 |
| Office of Experiment Stations..... | 626, 627, 628, 631, 632, 633,
634, 635, 636, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 651,
652, 654, 655, 656, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 671, 672 |

| | Page. |
|---|--|
| Scott, Hon. Charles F., a Representative from Kansas, etc.—Continued. | |
| Office of Public Roads..... | 672, 673, |
| 674, 675, 676, 680, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 695 | |
| Agricultural colleges, etc..... | 696, 697, |
| 700, 701, 702, 703, 707, 710, 712, 713, 715, 716, 718, 721, 722 | |
| Appalachian and White Mountain forests..... | 723, 725, 728, 729, 732, 733, 734, |
| 736, 737, 742, 750, 751, 752, 753, 756, 758, 759, 761, 763, 764, 767, 770, 784 | |
| Hybridization of animals..... | 824, 825, 826, 827, 828, 830, 831 |
| Gypsy-moth work..... | 847, 849, 850, 854, 856, 857 |
| Nutrition investigations..... | 860, 862 |
| Cattle-tick work..... | 862, 865, |
| 867, 871, 876, 880, 881, 882, 883, 889, 893, 894, 895, 897, 898 | |
| Soils, Bureau of—Milton Whitney, chief of Bureau, remarks of, on— | |
| Work of Bureau..... | 391 |
| Area surveyed and mapped..... | 392 |
| What a soil survey is..... | 393 |
| Surveys of experiment station and agricultural college lands..... | 400 |
| Agricultural colleges which are able to make soil surveys..... | 401 |
| Why Soil Bureau's work is chiefly in Atlantic and Gulf coast States..... | 401 |
| As to ability to get trained men for service..... | 403 |
| How men are employed when not in the field..... | 403, 404 |
| As to Congressional influence in locating surveys..... | 407 |
| Work proposed the coming summer..... | 411 |
| Cooperation by States..... | 413 |
| Soil-utilization work..... | 417, 420, 421 |
| Soil-management work..... | 417 |
| Authority for demonstration work..... | 419 |
| Reclamation of alkali lands..... | 420 |
| Duplication of work done in Bureau of Plant Industry..... | 424 |
| Oswald Schreiner, of Bureau of Soils, remarks of, on work in soil-fertility investigations..... | 429 |
| F. K. Cameron, of Bureau of Soils, remarks of, on work in mineral chemistry of the soil..... | 443 |
| Jay A. Bonsteel, of Bureau of Soils, remarks of, on work in soil utilization..... | 450 |
| Spillman, W. J., of Bureau of Plant Industry, remarks of, on his work in Bureau..... | 175 |
| Stone, Dr. W. E., of the Indiana Agricultural College, remarks of, on agricultural colleges..... | 719 |
| Snyder, Dr. J. S., of the Michigan Agricultural College, remarks of, on agricultural colleges..... | 712 |
| Statistics, Bureau of—Chas. C. Clark, associate statistician, Acting Chief of Bureau, remarks of, on— | |
| Work of Bureau..... | 597 |
| Organization of Bureau..... | 598 |
| Classes of statistical agents of Bureau..... | 598 |
| Method of obtaining statistics..... | 598 |
| Methods of compiling and issuing monthly crop reports..... | 601, 604 |
| Tobacco reports..... | 605 |
| Volunteer agents, how remunerated..... | 609 |
| Grand total of all agents of Bureau..... | 610 |
| Duties of each class of agents..... | 610, 619 |
| Percentage of agents who fail to report..... | 612 |
| Penalties for violation of secrecy as to crop conditions..... | 613 |
| Membership of crop reporting board..... | 613 |
| Other cotton estimates as compared with Department's estimates..... | 615, 620 |
| Average weights of cotton bales..... | 619 |
| Department began crop reporting in 1866..... | 621 |
| Division of foreign markets..... | 623 |
| Stanley, Hon. A. O., a Representative from Kentucky, remarks of, on— | |
| Bureau of Biology..... | 533, 534, 535, 537, 539, 541, 542, 543, 547 |
| Division of Accounts..... | 565, 574 |
| Bureau of Statistics..... | 601, 604, 605, 606, 607, 609, 611, 612, 613, 614, 615, 616, 622, 624 |
| Office of Experiment Stations..... | 640, 644, 645, 646 |
| Appalachian and White Mountain forests..... | 763, 764 |
| Swamp lands, drainage of, remarks on, by Hon. Joseph T. Robinson, a Representative from Arkansas..... | 526 |

| | Page |
|--|---|
| True, Dr. A. C., Director of Office of Experiment Stations, remarks of, on work of his office..... | 627 |
| Underwood, Hon. O. J., a Representative from Alabama, remarks of, on soil survey work..... | 831 |
| Weather Bureau—Prof. Willis L. Moore, Chief of Bureau, remarks of, on— | |
| Work of Bureau..... | 1 |
| Mount Weather..... | 1 |
| Abandonment of weather stations at Pikes Peak and Mount Washington.. | 4 |
| Building at Mount Weather destroyed by fire..... | 4, 25, 35 |
| Supplemental appropriation to restore burned building..... | 5, 43 |
| Number of employees in Washington..... | 6 |
| Work and salaries of employees..... | 6, 9, 36 |
| Contingent expenses, increased estimates for..... | 8 |
| Messenger boys..... | 11 |
| Method of filling vacancies at weather stations..... | 12, 15 |
| Method of furnishing weather maps and data..... | 14 |
| School of instruction and training in Washington..... | 14, 19 |
| Average number of appointments per annum..... | 20 |
| New buildings for weather stations and cost of same..... | 23 |
| Evaporation work, cost and extent of..... | 26, 28 |
| Effect of temperature on rainfall..... | 29 |
| Seismological investigations..... | 32 |
| Weather reports, method of distributing..... | 37 |
| Telegraphing, cost of..... | 38 |
| Hurricane warnings..... | 40 |
| Wireless telegraphy..... | 40 |
| Forecasting, percentage of errors in..... | 42 |
| Weeks, Hon. John W., a Representative from Massachusetts, remarks of, on— | |
| Weather Bureau..... | 34, 37, 41 |
| Bureau of Animal Industry..... | 50 |
| Bureau of Plant Industry..... | 119, 121, 128, 136, 148, 154, 223, 228, 229, 230, 237 |
| Forest Service..... | 241, 254, 264 |
| Bureau of Soils..... | 401, 428, 833, 837, 840, 841 |
| Bureau of Entomology..... | 475, 476, 479, 511, 515, 516, 519 |
| Bureau of Biology..... | 532, 538, 550 |
| Division of Accounts..... | 564, 565, 567, 569, 570 |
| Office of Public Roads..... | 679, 680, 688, 690, 696 |
| Agricultural colleges, etc..... | 710, 717 |
| Appalachian and White Mountain forests..... | 724, 734, 736, 737, 741, 744, 748, 750, 751, 753, 754 |
| Gypsy moth work..... | 854, 855, 856 |
| Nutrition investigations..... | 861 |
| Cattle tick work..... | 882, 883, 884, 885, 886, 893, 894 |
| White, Dr. H. P., of Georgia Agricultural College, remarks of, on agricultural colleges, etc..... | 696 |
| Whitney, Milton, Chief of Bureau of Soils, remarks of, on work of the Bureau. | 391 |
| Wilson, Hon. James, Secretary of Agriculture, remarks of, on— | |
| Horse breeding experiments..... | 65 |
| Appropriations desired for breeding experiments..... | 69 |
| Demonstration work..... | 80 |
| Work of Bureau of Animal Industry..... | 86 |
| Tuberculosis in dairy cattle..... | 90 |
| Scope of organic agricultural act..... | 168 |
| Development of trees and plants for paper pulp..... | 170 |
| Wiley, Harvey W., Chief of Bureau of Chemistry, remarks of, on work of the Bureau..... | 346 |
| Woods, A. F., Assistant Chief, Bureau of Plant Industry, remarks of, on work of the Bureau..... | 95 |
| Zappone, A., Chief of Division of Accounts, remarks of, on work of the division. | 564 |

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